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CONGESTION PRICING AND INFRASTRUCTURE FINANCING

HEARING

BEFORE THE

SUBCOMMITTEE ON
WATER RESOURCES, TRANSPORTATION, AND INFRASTRUCTURE

OF THE

COMMITTEE ON
ENVIRONMENT AND PUBLIC WORKS
UNITED STATES SENATE

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CONTENTS

Page
Durenberger, Hon. Dave, U.S. Senator from the State of Minnesota 3
Lieberman, Hon. Joseph I., U.S. Senator from the State of Connecticut 9
Moynihan, Hon. Daniel Patrick, U.S. Senator from the State of New York 1
Symms, Hon. Steve, U.S. Senator from the State of Idaho 4
Warner, Hon. John W., U.S. Senator from the Commonwealth of Virginia 5

WITNESSES

Flanagan, Daniel V., Jr., president, The Flanagan Group, Inc. 28
  Prepared statement 88
Johnson, Allan V., executive director, Ohio Turnpike Commission and past president, International Bridge, Tunnel and Turnpike Association 22
  Prepared statement 83
Morrison, Steven A., professor, Department of Economics, Northeastern University 6
  Prepared statement 42
Pickrell, Don H., economist, U.S. Department of Transportation, Transportation Systems Center 15
  Prepared statement 72
Ruth, Heather, L., president, Public Securities Association 32
  Prepared statement 99
Winston, Clifford, senior fellow, The Brookings Institute 10
  Prepared statement 57

ADDITIONAL STATEMENT

National Industrial Transportation League 104

CONGESTION PRICING AND INFRASTRUCTURE FINANCING

THURSDAY, MARCH 21, 1991

U.S. Senate,
Committee on Environment and Public Works,
Subcommittee on Water Resources,
Transportation, and Infrastructure,
Washington, DC.

The subcommittee met, pursuant to notice, at 10:00 a.m. in room 406, Dirksen Senate Office Building, Hon. Daniel Patrick Moynihan [chairman of the subcommittee] presiding.

Present: Senators Moynihan, Durenberger, Lieberman, and Chafee.

OPENING STATEMENT OF HON. DANIEL P. MOYNIHAN, U.S. SENATOR FROM THE STATE OF NEW YORK

Senator Moynihan. A very good morning to our seminarians and our guests. I apologize if the other Senators are necessarily elsewhere and not on hand, there is no press, and really no audience. There are certainly no lobbyists, because we are going to talk about pricing. You may judge the importance of the subject as an inverse ratio of the number of people who want to hear about it. There is nobody here; only a minimum of people. These poor fellows have to be here, they are sort of paid to be here.

The subject that we are engaged on is a new one for the highway program and public works program generally. Ours is the subcommittee that this once great institution called the Committee on Public Works, the committee that built the dams and cleared the rivers and that sort of thing over the 19th century is now involved in the same activity, not as spectacular. We have come to an end of an era of the construction of the interstate.

The largest public works program in the history of the world. It has its origins in many places, the German highway construction of the 1930's was there, but probably the most specific place, the General Motors Futurama Exhibit at the 1939 World's Fair at Flushing Meadows in New York City probably established the mode.

I went to see it. I saw it many times as a youth. They displayed the elevated highways moving without any intersections through cities, and around cities. It was authorized in 1944 under President Roosevelt, as a post-war public works program and was expected after the Depression to revive.

Then in 1956 President Eisenhower approved a new program—the same program—that would uniquely involve a gasoline tax committed to this fund, to this purpose, a committed source of revenue, and 90–10 financing, 95–5 in some places. So the system went forward with enormous energy. The first segment had been built in New York State as the Thruway. The engineer, Bert Tallamy, a very creative civil engineer, came down to Washington to head the old Bureau of Public Roads, which was a farm to market grant road program. He proceeded to build the New York State Thruway everywhere.

In 1960, I published a paper, I don't know if you could dignify it with the term "paper," but it was a long essay in the Reporter called "New Roads and Urban Chaos." It said that although called the Interstate System and depicted as such graphically in maps, the majority of the money would be spent in cities, and this was properly seen as an urban system at least as much an interstate system, and that we did not know much about it, we did not know how to put one of these things thorough a city. This was something we did not know how to do. The thought was that we would do it badly and wreck our cities. I think in the main that happened. It was done and can't be undone.

One of the reasons it happened is that something happened to the planning. People like Galbraith have been so unjust as to describe economics as a failed profession, but a generation earlier urban planning was so described. I think probably it was the lack of any pricing system. But the money was free—90–10 money is irresistible money. I remember a very distinguished member of this committee describing a time when his Governor looked with some horror at some three-story mess being rammed through one of his more beautiful cities and said "What in the name of God is that?" and his highway engineer said "It's 90–10 money." That answered that question. It was 95–5 in the High Plains.

So somehow we have a situation where we have finished the interstate. The only segments left are a few bits and pieces left in urban settings, tied up in courts. Ironically by the way we learn how to build one of these things through a city, for example, the Westway in New York, from a city on Long Island to Manhattan, the techniques that were preventing them from being built were perfected to the point where we can't do anything.

The Administration has not offered us any new modes of transportation. Admittedly, openly, they would like to continue just fixing up the roads. We have heard a lot of testimony saying "Whatever you do, don't build more capacity. Use pricing." That is the first time this committee ever heard, in its history, the advice not to built new capacity. That's new. I don't know if any of our members know it. I don't see many of them around here. It is not something any of the lobbies will want. They will not want it.

Yet we get very able testimony from people like John Kane who has described for us, in terms that I have begun to understand, that congestion is a pricing mechanism. It is a very negative pricing mechanism, all you do is lose from it. Still, if you take the San Bernadino Expressway between 5:30 and 7:30, you get home, it takes an extra hour and a quarter in the price. You might be willing to pay $10 for it and you might not.

That's what we would like to hear from you. The Administration has for the first time—and it would be very helpful if I could ask

Mr. Weiss, our very able staff member, if we could get a little historical record of the Federal attitude toward toll roads. They have been very negative. It's kind of a regional attitude, for some reasons, toll roads have been an anathema. They are no longer such. The Administration has said they are OK.

We are going to experiment with some high speed techniques, we think. But mostly we would like, I think, with our rather modest goal of about $105 billion, which is about the GNP of Africa, I should think—no small sum—is to see if we just can't take a pretty good transportation system and make it more efficient and more user friendly without making it more costly.

How to do that without endlessly proliferating lanes is the question for which few persons have any real comprehension. But one of them is David Durenberger, of the great State of Minnesota. He has faithfully attended these seminars. He is thoughtful, foresighted, prudent, penurious, everything a man from that great Scandinavian entity ought to be.

OPENING STATEMENT OF HON. DAVE DURENBERGER, U.S. SENATOR FROM THE STATE OF MINNESOTA

Senator DURENBERGER. I have just an observation, Mr. Chairman. I suppose it is by way of a compliment to you, too. Do you notice that everyone in this room is younger than we are?

Senator MOYNIHAN. That moment comes. You know it.

Senator DURENBERGER. When we are dishing out the 90–10, this room is filled to overflowing. At least half the people here are our age or older. When you are talking about finding a more efficient way of doing things, we are surrounded by those who have a stake in the future.

Senator MOYNIHAN. That's a very nice way to put it. If we succeed, you will have more cost efficient lives, whatever that means, the people who are normally stuffing this place have already stuffed themselves with the 90–10 and want more.

Senator DURENBERGER. I will say no more. I have a statement that I would appreciate being made a part of the record.

Senator MOYNIHAN. Your statement, as well as statements from Senator Symms, our ranking Member, and Senator Warner, will be inserted into the record at this point.

[The statements referred to follow:]

OPENING STATEMENT OF HON. DAVE DURENBERGER, U.S. SENATOR FROM THE STATE OF MINNESOTA

Mr. Chairman. I am pleased to be here today as the Senate Environment and Public Works Subcommittee on Water Resources, Transportation and Infrastructure hears testimony regarding congestion pricing and infrastructure financing.

I am pleased to be able to listen to some of the testimony which will be delivered on this interesting and controversial topic. I have somewhat mixed feelings about the topics of today's hearing. On one hand, I recognize that expanded private-public partnerships in transportation projects offer an excellent opportunity to augment available public funds with private capital to begin to redress the substantial backlog in transportation infrastructure. Furthermore, congestion pricing may also be an important means which some cities will employ to reduce air quality problems and ease gridlock. On the other hand, I know that the citizens in my State are very wary about toll facilities and are not supportive of tolls except under very specific conditions.

I am not sure that all of my colleagues on this Committee are aware that Minnesota is a State which is essentially devoid of toll facilities. There are only three toll transportation facilities in the State and all three are bridges for auto traffic. One crosses the U.S.-Canadian border at International Falls. Another uses an old railroad bridge to cross the Mississippi River and connect the two Twin Cities communities of Inver Grove Heights and St. Paul Park. The third and newest facility is a new bridge across the Red River between Fargo, North Dakota and Moorhead, Minnesota. Construction of this bridge was facilitated by the 1987 Surface Transportation and Uniform Relocation Assistance Act. Consequently, most of the citizens in my State are unfamiliar with the reasons for toll facilities and will need some education and convincing as a situation arises where a toll financing of a transportation facility might be the best option.

I also want to note that the State of Minnesota is currently struggling with the issue of loosening the State's current tight restrictions against toll financed transportation facilities. Yesterday, Minnesota Transportation Commissioner Riley was rapidly preparing to testify to the Minnesota State Legislature on this issue. The gist of his testimony are essentially along the lines which follow.

First, the Minnesota Department of Transportation (MnDOT) is currently disinclined to create public toll facilities for transportation projects already built or in the State's five-year plan. Minnesota taxpayers and motorists have significantly contributed to maintaining roadways and bridges in good shape and keeping roadway congestion low.

Minnesota citizens would prefer to minimize roadway congestion with other time-proven non-toll methods. In the last 15 years, Minnesota has developed and is deploying a cutting edge traffic management system (Guide-Star) which was lowered traffic congestion ont he Twin Cities' major intracity Interstates despite enormous growth of the region. Minnesota also strongly encourages and facilitates thoughtful urban planning to control the adverse effects of urban sprawl. Furthermore, it has expended considerable effort to encourage to the voluntary use of high-occupancy vehicles and is currently looking at the feasibility of constructing a light rail transit system.

Second, it is very important the MnDOT retain a significant role in the planning, construction and maintenance of toll facility to ensure that such projects do not disrupt the State's public transportation system operations and long-term plans. It is not hard to visualize the potential traffic problems which could be created if a multi-lane road were independently built without regard to the capacity of connecting roadways to handle traffic to and from such a facility.

However, MnDOT and a growing number of Minnesota are becoming increasingly aware of the opportunity that innovative public-private partnerships offer to accelerate the construction of transportation projects which the State eventually plans to build, but not in the foreseeable future. Minnesota recently experimented with the concept of accelerating the construction of a transportation facility financed with private financing. That particular project was the toll bridge between Moorhead, Minnesota and Fargo, North Dakota which I mentioned earlier. It may be that similarly structured transportation projects could proliferate if State and local communities are given the flexibility to consider alternate financing options.

In closing, I want to thank the Chairman for holding this hearing. I especially look forward to hearing the testimony of the second panel. I know the Chairman shares my interest on tapping private funds to help finance the huge backlog of unmet infrastructure needs. I look forward to working with him on this issue in this Committee and in the Senate Finance Committee.

OPENING STATEMENT OF HON. STEVE SYMMS, U.S. SENATOR FROM THE STATE OF IDAHO

Mr. Chairman, I am pleased the subcommittee is meeting this morning on the complex but very important issue of congestion pricing. Every organization that has looked seriously at the range of issues we must address in the next highway authorization bill has identified urban congestion among the most important of those surface transportation issues. Congestion pricing may be one way to instill some powerful market-driven forces into our program to help reduce the traffic jams that frustrate commuters, get in the way of public safety and emergency vehicles, and generally hinder economic activity and growth.

I look forward to reviewing the testimony of our witnesses and to our debate of congestion pricing as the highway bill is drafted.

OPENING STATEMENT OF HON. JOHN W. WARNER, U.S. SENATOR FROM THE COMMONWEALTH OF VIRGINIA

Mr. Chairman, and members of the committee, I am pleased today's hearing will focus on one of the most frustrating problems facing our transportation system in our Nation—traffic congestion.

I am looking forward to hearing the witnesses today present their views on the issue of congestion pricing, as one solution to help alleviate congestion on our highways.

Congestion pricing refers to a system of charging for highway or bridge user-tolls based on peak hour travel demand. Current Federal law bans tolls on Federal-aid highways. Furthermore, traditional manual toll collection itself hardly speeds traffic flow during peak hours. The result, as Professor Kain pointed out in his testimony before the subcommittee on February 7th, is that congestion itself becomes the means of pricing highway use. Professor Kain testified that congestion's tremendous inefficiency as a pricing mechanism requires a thoughtful reauthorization of the Federal highway program, one which considers more efficient use and maintenance of existing resources.

Mr. Chairman, I recently introduced legislation that will help urban and suburban areas of the country cope with increasing levels of traffic congestion on the Federal Interstate System.

Urban and suburban segments of the Federal Highway System have become increasingly congested as traffic volume has increased beyond expectations. In many areas, the system is simply breaking down under huge loads of traffic.

The legislation I introduced would create a new category of Federal highway funding to expand the capacity of heavily traveled portions of the Federal Interstate Highway System located in suburban and urban areas of the country. Beginning in fiscal year 1993, $2 billion a year for 4 years would be made available nationwide for this new program.

Funds authorized under this legislation could also be used for construction of noise walls or other sound abatement devices, acquisition of rights-of-way for construction of mass trasit facilities, and acquisition of land for park-and-ride type facilities.

The type of funding program I have proposed is desperately needed throughout the Nation. The Transportation 2020 Program held a series of 65 forums across the country to discuss the future of the Federal Highway Program. Witness after witness in State after State testified about the critical transportation problems that urban and suburban areas are facing.

In metropolitan areas all over the country, interstate highways approach complete gridlock during peak travel periods. The result is that commuters cannot get to work and interstate commerce cannot flow. That translates into reduced productivity, lost income, and time and money ill-spent.

Funds provided under this legislation could be used to widen interstates where traffic overloads occur daily during rush hours. Bottlenecks could be widened or even double-decked.

The legislation addresses these critical problems by directing Federal funds to the areas of the country where traffic congestion has virtually closed-down the Federal Interstate Highway System.

Funds would be allocated to the States based on a formula which gives preference to urban/suburban areas with high levels of traffic congestion on the interstate system. Rural areas of the country, however, would not be adversely affected because the Federal Interstate Construction Program is nearly complete and the legislation does not affect other highway funding categories.

The Interstate System started in 1965 is nearly complete and the current highway program is scheduled to end in 1992. We must begin now to look at changes that need to be made to address our Nation's transportation needs. In the next 2 years Northern Virginia, Tidewater Virginia, and other urban/suburban areas of the country face tremendous needs in the area of transportation improvements. The legislation addresses these needs in a way that will bring relief not only to Northern Virginia, but to other regions of the country as well without penalizing rural or less populated areas.

By introducing this legislation, I do not intend to overlook or underestimate the problem facing less urbanized sections of Virginia or the Nation. I intend to work diligently to see that those needs are addressed as well. This bill provides an important starting point for discussion of ways to address one particular aspect of our transportation problem as Federal, State, and local representatives and highway users begin reviewing the Federal-Aid Highway Program this year.

It is my intention to work with my colleagues, the States, localities, highway user groups and other interested parties to address other vital transportation needs.

As the hearings begin in the Senate on the Nation's transportation needs in the post-interstate period, these same parties will focus on what form any new highway program should take. If there is to be a new Federal-Aid Highway Program to replace the current program which will soon expire, it is vital that expanding urban interstate capacity be a key component of such legislation.

I urge members to support this legislation

Senator MOYNIHAN. All right, sir, then we will go right ahead. I can think of no better way than just to ask each of you to put your statement in the record and proceed exactly as you like. We have plenty of time and would like to hear from you. Dr. Winston, you are first. Dr. Winston is a Senior Fellow at the Brookings Institute.

Mr. Winston: Actually, if we could have Dr. Morrison go first. We have sort of coordinated our testimony.

Senator MOYNIHAN. You have worked that out and find it is more cost efficient for Dr. Morrison to go first? Dr. Morrison, we welcome you. You are indeed at Northeastern University and, this is wonderful, you are the fellow who worked out the economics of airline deregulation.

Mr. MORRISON. And he's the other fellow.

Senator MOYNIHAN. Thank you for that. It now costs more money to get to Washington from Albany and back than from Washington to Copenhagen and back, and they are the two fellows who did that.

Mr. MORRISON. We explained why it was good, we really didn't do it.

Senator MOYNIHAN. Because who would want to go to Albany, is that your view?

Mr. Winston: Stay a Saturday night in Albany, it will be cheaper.

Senator MOYNIHAN. We have been thinking about you two. Our home is about 80 miles from Albany, and my wife was going to go up and check out the garden and all, it's in the country. Then she found out what the fare was. Then we were thinking about our golden years ahead of us, in which we would be sitting around and in September saying "You know, it would be wonderful to go up and spend the weekend at the farm. Let's see, is there a thousand dollars left in the bank account?"

All right, Dr. Morrison. We welcome the man who gave us the $440 round trip flight to Albany.

Mr. MORRISON. And the $454 round trip from Boston to Washington.

Senator MOYNIHAN. That's right, you've just been on the trip.

STATEMENT OF STEVEN A. MORRISON, PROFESSOR, DEPARTMENT OF ECONOMICS, NORTHEASTERN UNIVERSITY, BOSTON, MASSACHUSETTS

Mr. MORRISON. Thank you. Is highway congestion an immutable fact of modern urban life? Sometimes it seems so. No matter what we do, millions of people waste thousands of hours each day going about their daily business. At the same time, the ability of governments to meet this challenge is reduced because their budgets are already overburdened by many competing needs.

Our highway congestion problem has the same basic cause—although a more ready solution—as the long lines we see in news reports from the Soviet Union. Both reflect shortages induced by prices set too low. The price system, which we rely on to ration nearly all the goods and services in our economy, is usually ignored in seeking solutions to highway congestion.

Users already pay a large share of the costs of roads through State and Federal taxes on gasoline. These taxes served us well when roads were uncongested, but in today's congested environment they come up short. Because the demand for highways is very time and place specific, gas taxes are simply too blunt an instrument to ration scarce peak-hour highway capacity effectively.

The price system works when the price of a good reflects the cost to society of producing it. When prices equal cost, consumers receive all goods and services that they value more than the cost to society of producing them. Society has rules in the form of antitrust laws to prevent prices from rising too far above costs, because of the inefficiencies that result. Sometimes the opposite occurs and prices fail to reflect society's full production costs, pollution is a classic example. Here, some of the costs of production are not borne by firms, but are born by the public at large.

Senator MOYNIHAN. Is that what you call externalities?

Mr. MORRISON. Yes, externalities.

Senator MOYNIHAN. You will find there is a pattern of interruption in these things.

Mr. MORRISON. In this regard, congestion and pollution are no different. They are both externalities.

Drivers take into account only those costs that they bear. They do not consider the costs of delay that their trips impose on others. Congestion tolls are specifically designed to make drivers take into account the cost they impose on others.

Rather than use price to ration highway capacity, we try to reduce congestion by building new roads, using high occupancy vehicle lanes, subsidizing transit, etc. But as experience has shown, these approaches founder on their own success. Soon, highways are as congested as before. Why? Because most people prefer driving to other modes, congestion itself limits peak-hour automobile use. When a policy initially reduces highway congestion, travelers switch from other modes, other routes, and other times of day until congestion is as bad as before. In other words, if you build it, they will come.

Senator MOYNIHAN. That's nice.

Mr. MORRISON. This is not to say that these measures offer no benefit. But using congestion as a rationing mechanism is inherently wasteful. One driver's delay does not enrich someone else. It simply wastes time. If price were used as the rationing mechanism, my toll payment equals the government's toll receipt. No resources are used in the transaction, except the cost of setting up and operating the collecting mechanism. Drivers who impose more costs on society than they value their trip are priced off the road.

Congestion pricing has been tried in Singapore and in Hong Kong. Starting in 1975, a windshield sticker has been required to enter the central areas of Singapore during morning rush hours. This policy reduced traffic by about 25 percent. Estimates of the benefits exceed the costs. From 1983 to 1985 Hong Kong ran an experiment with electronic road pricing in which test vehicles were equipped with "electronic number plates."

When a vehicle passes a toll point, the electronic number plate transmits a unique identification number to a computerized receiver that stores the information. The vehicle's account is charged for a predetermined number of units, depending on location and time of day, and a bill is sent to the vehicle's owner at the end of each month. Although Hong Kong's government decided not to pursue the scheme, technologically it was a success and the benefits were fourteen times the cost.

Although highway congestion pricing has not been implemented in the U.S., several studies have estimated the level of congestion tolls necessary to achieve the right amount of congestion and the benefits that would result. Estimates range from 10 cents to $1 per car mile, and these are stated in 1991 dollars, depending on existing conditions, with an attendant reduction in peak-hour traffic between 10 and 25 percent. A rough estimate of the benefits of implementing such pricing nationwide is $8 billion in 1991 dollars.

What about the assertion tolls hurt the poor? Whether the poor suffer from congestion tolls depends on how the government spends the toll revenue. For example, congestion toll revenue could be used to subsidize mass transit, which would benefit the poor. Only a distinctly pro-rich use of the toll proceeds would leave the poor worse off.

Taxes, tolls and user fees serve two masters. On the one hand, they raise needed revenue. On the other hand, they influence the allocation of resources. Sometimes these goals are in conflict, for example, tolls on uncongested highways and bridges. But for congested highways, tolls designed to ration highway use would raise the revenue needed to build and maintain the highways. Gas taxes, registration fees and the like would no longer be needed.

It is perhaps premature to suggest that congestion pricing be introduced en masse, but it is time for some well developed, visible experiments to guide policy makers toward the next step.

Thank you.

Senator MOYNIHAN. That was a marvel of economy. That really is as if you just wrote out an equation on a blackboard. Two pages followed by attachments. That is a beautiful reference to Field of Dreams. In other words, if you build it, they will come. I want to say to our very distinguished, relatively new member of this committee, Senator Lieberman, that we came here to discuss pricing. So there is nobody at the press table, from the trade journals, and there is nobody from the lobbies. There is nobody from staff on either side. And so much for pricing.

Then Senator Durenberger arrived and observed that everybody in the room is younger than us. If some economist worked that out, why is it that there is a moment in life, up until which everybody is older than you, and there is nothing, no float, suddenly everybody is younger than you?

Anyway, that moment is passed. He observed that it could be because all these people here stand to benefit from some kind of pricing mechanism if we can build it into the system. Whereas all the people who have benefitted from highway monies are playing golf in Palm Beach this very day. But we welcome you of course, and you might want to make an opening statement.

OPENING STATEMENT OF HON. JOSEPH I. LIEBERMAN, U.S. SENATOR FROM THE STATE OF CONNECTICUT

Senator **LIEBERMAN**. Thank you, Mr. Chairman. They do all look younger.

Senator **MOYNIHAN**. Resist that moment.

Senator **LIEBERMAN**. I will push it off. I suppose we could say optimistically that it is in relatively uncovered hearings like this that genuine revolutions begin, unbeknownst to the public. Also, it may be that, or it probably is, that all those people who have been grumbling in traffic congestion this morning and will grumble again this afternoon don't understand that what we are doing here today is directed at relieving them of that. There is an invisible way, at least for most people, in which governmental policies, as you all have and will testify to, have substantially caused the congestion that people are so unhappy about at least two times a day, but not clearly so.

Anyway, Mr. Chairman, I am delighted to be here. I have an opening statement which basically makes that point.

Senator **MOYNIHAN**. We will put that into the record.

[Senator Lieberman's statement follows:]

OPENING STATEMENT OF HON. JOSEPH I. LIEBERMAN, U.S. SENATOR FROM THE STATE OF CONNECTICUT

Thank you, Mr. Chairman, for again proposing a stimulating and important hearing.

Based on the material I have reviewed for this hearing, and on my experience with the Clean Air Act in the last Congress, it is clear to me that both our suburban and urban metropolitan areas are suffering from and will continue to bear the brunt of congestion and pollution caused in large part by our past and present transportation and energy policies. These policies subsidize the single passenger vehicle traffic that leads to congestion at peak travel hours. We do this by encouraging employers to provice free parking to their workforce, and by making travel by highway less expensive than travel by transit or train or bicycle and more convenient than car or vanpooling. In this way we are subsidizing and making least-expensive the very practices which cause the most damage—to our highways themselves and to our environment—both natural and physical.

For too long, Mr. Chairman, we have operated from the Federal level as if the answer to congestion was simply just to build more roads. The problem, as many of our distinguished witnesses point out in their testimony, is that the more roads we build the more traffic we get.

In the Clean Air Act, we took some modest steps forward to address these problems. Localities in non-attainment areas are now required to carefully estimate vehicle miles traveled in their areas; if these estimates are wrong, areas must consider implementing transportation demand measures. The Act requires that transportation planning decisions be consistent with a locality's air quality needs. We also implemented some modest ride-sharing provisions.

I am particularly interested in the congestion-pricing methods suggested by our hearing witnesses today. We have spent the last century building a system of transportation which will keep us reliant to a large degree on highways, automobiles, and trucks. But I am optimistic that a large part of our efforts can now be focused—with the reauthorization of the Surface Transportation Act—on looking at managing the demand side of the transportation equation, rather than only the supply side. Our energy and our environmental concerns are demanding a new look at alternatives.

Senator **LIEBERMAN**. Thank you very much. We started, in the Clean Air Act, to take some very modest steps to recognize the way in which Government policy helps create congestion now and the way in which we might try to create inducements in the other direction. Now, under the leadership of the Chairman, we see this bill as the opportunity to educate our colleagues, perhaps someday even the public, about the possibility of working through this law to change the inducements we have given people and to help relieve some of that congestion by creating other pricing incentives.

I am confident, Mr. Chairman, that you and I will be around long enough to enjoy the benefit of what we will begin here today.

Senator MOYNIHAN. I will make a point that you gentlemen will want to think about and comment on, that the difference between the Clean Air Act and this bill is that in this case we will be spending, actually spending, Federal monies, $105 billion. The Clean Air bill was a very difficult set of incentives, because we were spending other peoples' money, and spending it out into other generations.

I don't have to tell any of you who have learned of the sinfulness of mankind and womankind, that that is a temptation to be very profligate, indeed. We wrote into the Clean Air Act a benefit cost analysis, a permanent condition. Of our seven major environmental bills, only three allow price considerations at all. They are enacted in enthusiasm—no cost is too great for cleanliness, that's what Mommy told us. Enough of that.

But so that Senator Lieberman will hear Mr. Morrison's lovely image, he said "Our highway construction congestion problem has the same basic causes, although a more ready solution, as to long lines we see in news reports from the Soviet Union. Both reflect shortages induced by prices set too low." You are used to that, the long lines and empty counters.

Dr. Winston, we welcome you next, sir, from the Brookings Institute.

STATEMENT OF CLIFFORD WINSTON, SENIOR FELLOW, THE BROOKINGS INSTITUTE, WASHINGTON, DC.

Mr. WINSTON. Thank you. What I am going to do is focus on three points that extend the basic themes that Dr. Morrison put forth in his testimony. The points will be additional benefits from congestion pricing that have not been mentioned to the critics, and recent experimentation with congestion pricing in other parts of the world and in the United States.

Turning to additional benefits, one of the important things to think about with congestion pricing is that it should be thought of as part of a package of efficient infrastructure pricing that will ultimately be able to eliminate a large part of the highway deficit and enable it to be user-supported, as opposed to supported by general revenues.

There are two things you want to think about with highways: the capacity or the congestion caused largely by the cars, and the damage that is done to the roads caused by the trucks. I realize this session is dealing with congestion pricing, but congestion pricing is going to be tied in with congestion pricing of the trucks and their use and damage of the roads. The idea is to substitute the fuel tax, which is currently used for the trucks, with a tax based on the damage the trucks do to the road, which is based on the axle weight of the trucks.

It is not necessarily the biggest trucks that do the most damage to the roads, it is those trucks with few axles that are heavily weighted.

Senator MOYNIHAN. You are speaking now as an engineer and this is something tested. You are describing laboratory tests, and field tests.

Mr. WINSTON. That's exactly right. It is engineering related.

Senator MOYNIHAN. The amount of pressure applied at a fairly narrow point which is the point of contact of a wheel on a surface, which is six inches or twelve inches, or whatever it would be, that point has certain consequences and they vary along the weight of the vehicle?

Mr. WINSTON. The simple, intuitive way to figure it out is to stick your hand out, if I could bear your indulgence, your hand is the road, put two fingers down with a given amount of pressure, then put one finger down with the same amount of pressure. You will feel more pain with the one finger than the two fingers. That's the whole concept of the axle weight doing the damage.

Senator MOYNIHAN. You have given us a new thought. We want to measure the amount of space used up and the cost to the structure.

Mr. WINSTON. That's right.

Senator MOYNIHAN. Gentlemen, do we hear that? That's two principles of pricing, not one. We don't need to think a truck needs to cost more because it takes up more space, but actually because it makes more of an impact.

Mr. WINSTON. Right. What I am suggesting is that you start thinking in terms of a package, you want to price cars for the capacity and price trucks for the durability. By the way, this axle weight pricing program has actually started in the State of Oregon. For certain trucks, Oregon has this axle weight pricing program in place.

The advantage, or why I am mentioning this, not to belabor the point about axle weight, is that jointly, when you combine the axle weight pricing of the trucks with the congestion pricing of the cars, the highway system becomes self-financing. You don't have to rely on general revenues. The people who use the roads are paying for them.

So my point is that one of the advantages of congestion pricing is that it can help eliminate a highway deficit which comes out of the general revenues. In terms of the benefit, you start thinking not of the $8 billion to $10 billion that Dr. Morrison mentioned from congestion pricing, but you are thinking really on the order of close to $20 billion in benefits from the joint congestion pricing and axle weight pricing of the trucks.

My second point has to do with another deficit that congestion pricing can help, and that is the transit deficit. We know that urban transit is also supported out of general revenues. What will happen when you have congestion pricing is that you will lead to shifts out of cars into transit. Some people will now find that the transit alternative is more attractive, because the price of using the highway is too high for them. That will induce additional transit service to handle additional demand on transit facilities, reducing the time between the buses. They will be running more frequently. Now the wait time will go down.

You then induce an additional shift to transit because the service is better. The final step then is that you are offering better service in transit, you can raise the fares, and you will then be bringing in more revenues for transit. So congestion pricing is now helping another deficit, the transit deficit.

My final additional benefit that is important for congestion pricing, which often is not mentioned, is that it could have a big impact on industry competitiveness and the benefits of trucking deregulation. What trucking deregulation did was lead to changes in operations and firms in terms of how they handled their inventories. They applied the Japanese technique, or it is allegedly attributed to them——

Senator MOYNIHAN. Let's call it deadening. The deadening principle.

Mr. WINSTON. The just in time inventory process. That depends on very reliable transportation service showing up at the dock, your inventory is ready to be shipped, and the truck goes out. This process is critically dependent on a very reliable transportation system. When you have congestion, you are not just slowing up cars and making their arrival times unreliable. You are doing the same thing to trucks.

So what congestion pricing will do is not only help smooth traffic flow and reliability of cars getting to their destinations, but it will also help the reliability of trucks getting to their destination. That will enable them to coordinate the transportation system much better with the production and inventory process, and enable them to get the benefits of trucking deregulation to the maximum level.

What if you don't implement congestion pricing? One draconian measure has been to ban trucks from downtown urban areas in the interest of reducing congestion and pollution. So here we have something that is a worse alternative in terms of competitiveness and production. Keeping the trucks out of the area will even raise production costs more.

What about the congestion pricing objections? The first one is the technology. People tend to think of congestion pricing as toll booths and long lines of cars lined up to pay. It may take even longer to get through the booth to pay the toll than it does to save time from the toll.

Senator MOYNIHAN. For what it's worth, Dr. Winston, don't be too dismissive of that long wait. It was during that wait that Dr. Danby thought up magnetic levitation, at the Bronx-Whitestone bridge in 1960, and Leo Zellar at the red light in London in 1932 when he thought up fission. Other than that, its utility has proved minimal.

Mr. WINSTON. He might have thought of it anyway, happily going through the road. Obviously, we have more modern technology now, the automated vehicle identification system, AVI, where you don't disrupt a vehicle's journey. This is no fantasy idea. These things are in place, as I will mention.

Senator MOYNIHAN. You used an initial, AVI? Tell us what it means.

Mr. Winston. Automated Vehicle Identification System, where you actually can identify a vehicle as you——

Senator Moynihan. That's what Dr. Morrison said they used in Singapore.

Mr. Winston. Exactly. And several other places, including in this country.

Senator Lieberman. There are some in Minneapolis and St. Paul.

Senator Moynihan. In Minneapolis, that Nordic enclave where they are ahead of even the Singaporese. It's incredible what they do up there. It's the weather. They have nothing else to do but sit inside and think.

Mr. Winston. What this does is record motorists' travel, and bill motorists at the end of the month. The way the current system is designed, what they do is tend to dig up the road and put in a little sensor that will identify the vehicle as it goes over it. The vehicle has a transponder that then connects up with the sensor. You don't actually have to use that technology. You can actually have an AVI without digging up the roads by hanging up the AVI system from a freeway sign, and putting the transponder on the roof of the car or on the windshield. So you can intall it in a relatively easy way and put it in many streets.

At Los Angeles Airport, they actually have one of these AVI systems from above. The advantage of this is that it will replace the more expensive technology, smart car-smart streets that you may have heard of, this futuristic idea where you would have a little TV screen in your car with a little grid network, and some central control is telling you which are the less congested streets to go on. That would cost a fortune—far more than what I am proposing here. And it is still not clear that that technology will solve the congestion problem.

Second objection—privacy. That has always been a major concern about congestion pricing. People will have records of where you are and what times of day you are traveling around through town. There is a response to that. You could put what they call the smart card approach—it works just like the Metro, you buy use of the highway system in advance, and basically you work off your dollars when you go over these AVI systems, so you can respond to the privacy problem.

The final objection is the income distribution concern, that the toll rise will hurt the poor commuters. Basically, what is feared is that you will price the poor off the roads, put them somewhere else, and you will help the wealthier people. The key to this is really a specific redistribution plan to compensate people. An example is to invest in transit, lower property taxes, lower fuel taxes. I think I might be overstepping the bounds if I said to lower Social Security taxes. Maybe you might not want to justify that on those grounds.

Senator Moynihan. It's all right by me. I don't know what the ranking member thinks.

Mr. Winston. I will give you an example of this shortly, where they actually sold congestion pricing on explicitly this kind of income redistribution.

Senator Moynihan. Who did?

Mr. WINSTON. I'm getting to it. My final point then is experimentation. If this is such a great idea, why aren't we doing it? Why isn't it in use? The fact is that it is actually getting to be in use in various places and people are very serious about it. In Hong Kong, although they originally turned it down, my latest reports are that it is back in consideration and could very well be implemented in the future.

In Singapore, they are now deciding what kind of AVI technology to have. They are definitely going to have the congestion pricing system I have talked about.

In the Netherlands, they are working on their own technology. They want to put in one of these systems, but they want to build their own AVI system.

Senator MOYNIHAN. Hong Kong had a system in use, that was discontinued and may be returned?

Mr. WINSTON. It may be put back up. There were some political problems that I think other people could give a more accurate description of than I could. But my latest information is that it is actually back in consideration to be put in use.

In Italy, of all places, they have a smart card on a toll road. They are implementing the smart card technology there. In Sweden, they have given the go-ahead for 1994 in Gottenberg. They are going to have congestion pricing in 1997 in Stockholm. This is a case where they got the approval because they made an explicit commitment to give the toll revenues to public transportation before they went ahead with congestion pricing.

In Norway, they have a toll ring, they call it, in Oslo, and they have an AVI system that goes around the city.

In this country, we have a number of things. One, we do have an AVI system in Dallas and New Orleans. The Dulles Toll Road is currently deciding on what technology they want to use. In California, the Department of Transportation has just finished negotiations of contracts with four private State highways. There are going to be some private highways in California. At least two of them have committed to instituting congestion pricing and putting in an AVI system.

So there is a grass roots movement, if you will, and I think we will be seeing this policy shortly.

Senator MOYNIHAN. Well, we thank you very much, Dr. Winston. Our ranking member of our full committee has arrived and may want to make some comments. We were saying earlier when we opened that this is a discussion of pricing of transportation, and accordingly there was nobody at the press table, no staff, and almost no witnesses because the money is to be made when this is free goods, not when it is rationed by a pricing system.

Then Dave Durenberger came in and observed that all the people here were younger than we were. We suggested that they know they would benefit from something like this. I leave that thought to you, Governor.

Senator CHAFEE. Well, thank you, Mr. Chairman. I am very glad you are doing this. This is extremely interesting to me. I have just been reading over Professor Morrison's material.

There are two things that would help me. One, there seem to be references to Hong Kong and Singapore, and a bit of vagueness. Has anybody seen it and actually viewed it? Is this fact?

The other thing that would be helpful is knowing whether pricing on congestion is going to result in the construction of an inner city or commercial city outside of our current cities? In other words, are we going to have greater urban sprawl?

Dr. Pickrell?

Mr. PICKRELL. Could I respond? I have been to Singapore, and utilized the area licensing system, as they call it.

Senator CHAFEE. Well, you are going to testify, so I won't infringe on your statement, you can bring that out in your testimony. I am not asking you to answer those questions now, but if you could touch on it in your remarks, I would be interested.

In other words, this committee is the environment committee as well as dealing with highways and other matters. It's an odd committee. Senator Moynihan paves things and I try to keep them green, so we are not always demonstrating teamwork around here.

Senator MOYNIHAN. Senator Moynihan is not trying to pave anything.

Senator CHAFEE. I know, his heart is pure and he has the strength of ten.

Senator MOYNIHAN. Senator Moynihan's heart is not pure.

Senator CHAFEE. We can't agree on anything up here today. But if you could touch on those concerns, I would be glad to hear them.

Senator MOYNIHAN. Thank you. Dr. Pickrell, I think you are next, sir, or did you all have a different agreement?

Dr. Pickrell is a member of the Department of Transportation. He works in Cambridge, and I think you still work in that building that was scheduled for the Department of Defense?

Mr. PICKRELL. I am not certain of the history or future plans for the building.

Senator MOYNIHAN. What's your address?

Mr. PICKRELL. Kendall Square, in Cambridge. My impression was that it once belonged to NASA.

Senator MOYNIHAN. I got it for you, that's my point.

Mr. PICKRELL. It is not luxurious, but it is a home.

Senator CHAFEE. He can lean out of his office and watch the Red Sox play.

Mr. PICKRELL. Until the new Marriott was built, that was practically true. Now one has to rent a hotel room there to watch the Red Sox play.

STATEMENT OF MR. DON H. PICKRELL, ECONOMIST, U.S. DEPARTMENT OF TRANSPORTATION, TRANSPORTATION SYSTEMS CENTER, CAMBRIDGE, MASSACHUSETTS

Mr. PICKRELL. I am employed by a branch of the Department of Transportation, but I am required to inform you that I am appearing today was a private individual and that nothing I say should be construed as an official policy or recommendation of the Department. I am strictly voicing my opinions about these issues.

On the other hand, I certainly do appreciate the subcommittee's invitation to appear. I congratulate the subcommittee for its willingness to reexamine the fundamental principles on which the Federal Highway program should be based, rather than to spend its time engaged in assessing the future of the program strictly on the basis of how much money it will bring to this or that jurisdiction. I think this type of reconsideration is long overdue, and I applaud this subcommittee for having the courage to entertain it.

Let me start by responding to the two concerns that were just raised. I spent about three months in Singapore in the summer of 1980, working on a project for the Government during the course of which I was subjected to the central area licensing requirement on a daily basis, since we stayed outside the restricted zone and commuted to an office location that was within the zone.

At that time, the way the system worked was that one could purchase a monthly sticker to display on the windshield, or pay for a daily sticker that was to be displayed on the windshield during any time that vehicle appeared within a designated zone, comprising much of the downtown area of Singapore.

The way enforcement appeared to operate was that small groups of police officers would stand along the ring roads surrounding the restricted area at the places where radial roads intersected the cordon. They would simply record the license numbers of vehicles entering or leaving the restricted zone that failed to display the requisite license, and a citation would arrive in the mail of the owner of the offending vehicle sometime later. Political conditions being what they are in Singapore, my understanding was that people were quite dutiful about paying those fines.

Senator MOYNIHAN. Are you saying that those who didn't pay disappeared?

Mr. PICKRELL. No, I don't think so. It may be that their vehicles disappeared, but I am not certain. We did not tempt the system to see how rigorous enforcement was.

On the other hand, the system did have the defect that vehicles—we frequently used taxis to commute back and forth to work—vehicles that spent the entire morning rush hour within the restricted zone were not subject to the licensing requirement simply because they did not cross the cordon line, and there was no mechanism for enforcing compliance with the requirement by vehicles that spent the entire morning rush hour circulating within the designated zone. That was something of a defect within the system that may have been remedied by now. I am not familiar with that, perhaps others are more up to date on the system.

Senator CHAFEE. What year were you there?

Mr. PICKRELL. This was in 1980. So it was some time ago. But my reaction was, I found the system amazingly unobtrusive and simple. I was just stunned by how easily and efficiently it operated. It was a real revelation. I had expected a very much more intrusive mechanism for exacting this fee. It was simply stunning, how effortlessly it seemed to operate.

On the other hand, that was true about an awful lot of matters of government in Singapore, as well. I was very impressed by the efficiency with which many governmental functions were carried out. So it may be that the efficiency that seemed to characterize the operation of the area licensing scheme may partly reflect the customary dispatch with which governmental business is done in that nation.

On the other hand, I suspect that much of its simplicity and efficiency owes to the fact that it was a cleverly designed system that to a certain extent was able to capitalize on geographic peculiarities of that Nation, but could be reasonably closely approximated in many American cities. So I am a big fan of it, in short. I thought it worked very well.

Senator MOYNIHAN. And you do know of American cities that are planning it?

Mr. PICKRELL. I don't. There are preliminary plans, I suppose you might call them, in the Southern California area. The Department of Transportation came very close to sponsoring a test program in congestion pricing in a small beachside community in Southern California a number of years ago. In fact, I happened to be living there at the time. It was the only reason I learned about it. This was under the old Service and Methods Demonstration Program once operated by the Urban Mass Transportation Administration.

Senator MOYNIHAN. Perhaps you would give us a note later on about that.

Mr. PICKRELL. I would be happy to. There may be people in the audience who worked on that program. I did not. And I guess I would respond to the Senator's other concern about the potential for further decentralization of U.S. cities by saying that a more rational system of prices for highway use would, I believe, slow the current pace of suburbanization of both employment and population—certainly employment—in the Nation's cities. It is hard to imagine how a policy could promote any more rapid dispersion of employment and population than what has occurred in the last several decades in the U.S.

My opinion is that the current system of providing access to highways free of charge has been one of the major forces producing that decentralization, and that imposing a more rational system of charges for the use of highways at peak hours would dramatically slow the pace of decentralization. Perhaps that's an overstatement, but it would certainly not contribute to it as severely as does our current system.

Senator CHAFEE. Do all the panelists agree with that?

Mr. Johnson.

Mr. Johnson: I don't want to take that position.

Senator CHAFEE. You are going to have a chance when you testify, but I was just curious. I am glad to hear that. I am not sure I totally agree, I hope you are right. My thought being that you have a bunch of employees, 400 or 500, working, and they complain to the boss bitterly that they are having to pay $10 a week or whatever it is, for a sticker, whereas before they were used to getting up early. Have you noticed around Washington as you come in at 6:00 o'clock in the morning, every parking space is taken, practically. People have adjusted their lives.

Mr. PICKRELL. That reflects a different problem, which is the one I really came to talk about today. Maybe I ought to dive headlong into that.

Legitimate concerns about the manageability and evasiveness of complex road pricing schemes remain, but the continuing advances in electronics technology described by Dr. Winston and to be elaborated on by Mr. Johnson do suggest that it may now be time to reconsider the idea of systematic pricing of highways more seriously. At the very least, I believe Congress should remove any remaining restrictions on time variant pricing of highways constructed with Federal financial assistance.

Senator **Moynihan**. I just like that phrase. Time variant. That is a new thought in our systems, isn't it. It is the same toll at midnight as it is at 4:00. Time variant means days and hours.

Mr. **Pickrell**. Or perhaps even seasons and years. My understanding is that past Federal highway legislation has incorporated prohibitions against such time variant pricing, and I certainly believe that the time has come that any remaining prohibition or discouragement of that form of pricing that is incorporated in Federal highway policy ought to be eliminated.

I also believe the Federal Government should encourage States and local governments to conduct pilot or demonstration programs designed to assess the difficulties in implementing roadway pricing, and to identify the likely response of motorists to the imposition of these prices on a much wider scale.

The Hermosa Beach pricing experiment that I alluded to a few minutes ago was one such pilot project, but it was motivated by somewhat different concerns than the ones that bring us here today. I think we need to encourage pilot programs on a somewhat larger scale.

I think it will also be useful to resurrect the once active Federal interest in promoting demonstrations of less complicated substitutes for electronic road pricing, including peak hour bridge and tunnel toll surcharges, the pricing of parking space and downtown licensing requirements, ala Singapore, as well as priority treatment of car pools and transit vehicles on urban streets and highways.

One of these approaches, the pricing of commuter parking space in the downtowns and other densely developed areas of U.S. cities, is the focus of my testimony, as it was more than 10 years ago before another committee on which your colleague Senator Durenberger served. Since he has gone, he won't be subject to it for a second time, although he can be forgiven for not recalling what I told him 12 years ago.

At that time, I argued and I still believe, that in the absence of a comprehensive system of time variant tolls for street and highway use, more rational pricing of parking space is one of the most important objectives that Federal transportation policy can promote.

In particular, Federal tax policies need to be revised to curtail the provision of free and below market price parking space to employees who commute to work in the most heavily congested areas of our Nation's cities. While I appreciate that Federal tax policy is not the province of this subcommittee, I believe the widespread employer subsidization of parking that is fostered by current Federal tax policy exercises an immensely powerful influence on travel behavior, and stimulates the public's demand for continued spending to increase the number and capacity of urban highways.

Senator **Chafee**. Mr. Pickrell, could I just say one thing? I am sorry to interrupt. Unfortunately, I have to go to the floor and make a statement.

Senator **Moynihan**. On behalf of Sea Wolf Submarine.

Senator **Chafee**. Which employs 7,500 Rhode Islanders.

Senator **Moynihan**. Right.

Senator **Chafee**. This is extremely interesting, what you folks have to say. I commend you, Mr. Chairman, for having this hearing, and I am going to read what you have said and what Mr. Johnson has to say. I think it really is something we should spend a lot of time on.

Senator **Moynihan**. It would be the one departure in transportation policy available to us in this legislation.

Senator **Chafee**. And I'll bet it would stir up a hornet's nest, too.

Senator **Moynihan**. Not if you leave it to the governors to choose. Let them decide.

Senator **Chafee**. But will the mayors decide?

Senator **Moynihan**. Oh, the people who aren't here will be very much against it.

Senator **Chafee**. That's right. You and I have all the courage that comes with Senators who have four years to go on their terms, but——

Senator **Moynihan**. That's why we're here.

Senator **Chafee**. I appreciate you, and those who are coming after you, Mr. Flanagan and Ms. Ruth.

Mr. **Pickrell**. Anyway, I believe that in deliberating whether to support a major new Federal program of highway construction, it is critical that this subcommittee's members appreciate the extent to which the subsidization of parking in urban areas, as distinct from the more systematic underpricing of street and highway usage, increases pressures for——

Senator **Moynihan**. John Kain has very strongly talked on that point. Both Senator Chafee and I and four members of the committee are on the finance committee.

Mr. **Pickrell**. Then you perhaps can particularly appreciate this. Incidentally, I taught John Kain everything he knows about this issue. He has taught me many things, but this is the one area in which I have been able to repay him for the education he has provided me.

More than three-quarters of those who drive to work in U.S. cities use parking that is provided by their employers, for which 90 percent pay no charge. Although some of this employer-provided parking would not command high market prices, in both downtown and in a growing number of suburban office centers its price would provide a powerful inducement for commuters to use transit or join a car pool, if so many of their employers did not supply it free.

In fact, for many commuters the availability of free parking at work represents a stronger incentive to drive than if their employers offered instead to provide them with free use of an automobile and free gasoline for their trips to and from work. You can imagine the outcry that would result if Federal policy encouraged that kind of reckless behavior by employers.

The most direct evidence of the effect free parking can have comes from the response of commuters in Washington to the Federal Government's decision to begin charging employees for parking that was once provided free. When charges equal to 50 percent of commercial rates were imposed by Presidential order in 1979 and

1980, the number of employees driving alone declined by as much as 40 percent at some of the sites here in Washington. That figure is perhaps the high end of the response that one might expect in other cities. But it was nonetheless quite substantial, until the then-incoming Reagan Administration rescinded the earlier Executive Order and rolled back prices.

Senator **Moynihan**. The Reagan Administration was a great supporter of a bloated bureaucracy downtown. How better to do it than encourage its arrival by car.

Mr. **Pickrell**. As a person who came to work for the Federal Government during the Reagan Administration, I suppose I represent part of the evidence of the problem.

The major reason so many employers provide free or below cost parking to their employees is that its value is exempted from taxation as personal income. For those who drive to work, a free parking space is worth more in after-tax income than a salary increase equal to its market value, in direct proportion to the marginal Federal and State income brackets in which each employee's taxable income places her or him.

The Federal tax exemption of employer-provided parking stems from its classification under the Tax Reform Act of 1984 as a so-called working condition fringe benefit, that is, one of a class of benefits exempted from income taxation in order to encourage employers to provide more desirable working conditions.

But unlike the tax exemption of fringe benefits such as health insurance and retirement savings, which encourages behavior that Federal policy deems socially responsible, exempting the value of employer-provided parking from income taxation rewards behavior that a variety of other Federal policies seek to discourage, that aggravates traffic congestion, and that contributes to continued pressure for new investment in expanded highway capacity.

So here we have Federal policies decidedly at odds with one another, and encouraging behavior that the existence of contravening Federal policies clearly reveal that we regard as socially undesirable.

The ideal solution to this problem would be to amend the Federal tax code to reclassify employer-provided parking as a taxable fringe benefit, just as use of an automobile or meals provided at work or a variety of other benefits are now treated. Employers would be required to estimate and report its cash value in the same way they now treat certain other fringe benefits, and their primary motivation to provide free parking would be eliminated.

Parking benefits would still be subject to the so-called *de minimis* rule imposed by the 1984 Tax Reform Act, so that employers who provided parking with a low market value and thus did not induce much increased auto travel among their employees would not be subjected to burdensome accounting and reporting requirements, which is one of the common complaints about this proposal.

Although reforming any policy with so many beneficiaries is destined to be politically unpopular, it does have one decided advantage, namely that it would raise Federal tax revenues, initially by perhaps as much as $5 billion to $10 billion annually. Even in Washington, that strikes me as a sum that one ought not to dismiss lightly, particularly in the current budget environment.

Barring this direct approach to the problem, present Federal tax policy should at least be changed to require that employers who offer subsidized parking also offer their employees the option of receiving the value of these parking spaces as taxable income; that is, taking it in cash rather than in the form of a free parking space.

Most employees who are now offered free or below market price parking at work do not have the option of taking the cash value of that subsidy, even if they are willing to pay income taxes on that amount. But since no employee would be required to exercise this option, this minor change seems likely to arouse considerably less political opposition than the direct approach of taxing all employer-provided parking.

Some employees would be deterred from exchanging their parking places for tax by the taxable status of the latter, but others would prefer the resulting increase in after-tax income to the continued availability of a free or below market parking space. They would join a car pool or take the bus or train to work. Most importantly, the option of choosing cash instead of a parking space would be most attractive to employees who commute to locations where market parking prices are highest, because those are the employees who would receive the largest increase in income if they declined to accept their free parking places.

So this would target an incentive to stop driving alone in the very places where traffic congestion is now most severe, and the pressure for expanded highway investment is most intense.

Raising the current tax exemption of employer provided transit passes and van pool benefits from the current $15 ceiling that was established by the 1984 Tax Act, a measure that you and a variety of others in Congress have advocated, would be a worthwhile step, but ideally that action should accompany, rather than substitute for, taxation of the value of free parking.

By itself, increasing the already substantial subsidies to transit and other so-called high occupancy modes is destined to be ineffective in drawing users out of their automobiles, simply because the costs of commuting by these alternate modes are already so low that they will remain nearly irrelevant to most commuters' decisions to drive to work as long as free parking continues to be available to so many of them.

Raising the tax exemption of transit benefits could still help bring about more rational pricing of urban transportation, I believe, if it was offered as a *quid pro quo* for taxing some part of the value of employer-provided parking. The most appealing proposal I have heard would be to couple an increase in the value of transit and car pool benefits exempted from income taxation to some dollar threshold, say $50 (or I believe your proposal is $60 a month), with taxation of any value of employer-provided parking in excess of that amount. The exact value of the threshold could be set to achieve whatever overall effect on Federal tax revenues is desired.

By setting the threshold appropriately, you could make this proposal revenue neutral, or you could generate additional Federal revenue if that were also an objective. But the important point would be to couple an increase in the exemption of any increase in the exemption from income taxation of transit and other ride-sharing benefits, as they are commonly called, with taxation of the value of free parking over the amount of those benefits that was exempted.

I think by now it has to be clear that in the presence of such strong financial incentives to drive an automobile, even a dramatically expanded program of highway construction cannot prevent the intensification of traffic congestion in the downtown areas of our Nation's cities or forestall its continuing spread to their suburban areas.

While the systematic under-pricing of street and highway capacity represents the most pervasive incentive to drive, I believe an equally powerful inducement for many commuters stems from the widespread provision of free parking by their employers that Federal tax policy now encourages.

Unlike the under-pricing of urban streets and highways, widespread free parking is readily amenable to action by the Congress to eliminate it, which I would think would make it particularly attractive from this subcommittee's view. Taking that action, because it will increase the amount of income that is subject to Federal taxation for so many employees, will require vision and leadership. But I believe the alternative is another decade of spreading urban and suburban traffic congestion, regardless of the exact level of Federal spending on highways that Congress elects to authorize.

So by taking this decisive step toward more rational pricing of automobile travel, Congress can act to reverse of one of the most critical defects of current transportation policy. By doing so, it can at once improve the functioning of our existing transportation system, and discipline user's demands for investments in its continued expansion.

I apologize for going on so long.

Senator MOYNIHAN. Thank you, Dr. Pickrell.

Now, Mr. Johnson, who is in the very real world of running a turnpike. We welcome you, sir.

Your statement will be made a part of the record, of course, and you may proceed just as you please.

STATEMENT OF ALLAN V. JOHNSON, EXECUTIVE DIRECTOR, OHIO TURNPIKE COMMISSION AND PAST PRESIDENT, INTERNATIONAL BRIDGE, TUNNEL AND TURNPIKE ASSOCIATION, WASHINGTON, DC.

Mr. JOHNSON. Thank you, Mr. Chairman. I guess I am the only non-economist here this morning. I did not get my remarks down to two pages, at least as I had written them. I will try to condense that, though.

I am the Executive Director of the Ohio Turnpike Commission and the operating head of the Ohio Turnpike. I am also the Past President of the International Bridge, Tunnel and Turnpike Association, and Chairman of its Government Affairs Task Force. I am here in that capacity today.

I would like to remark, because of your earlier comments, that the Ohio Turnpike is one of the toll roads on the interstate system in this country. It is one of the major interstate roads, Interstates

80 and 90. It was constructed more than 35 years ago without one cent of that 90 percent Federal money you spoke of before.

Senator MOYNIHAN. Like our throughway.

Mr. JOHNSON. I might also say that I came here from Cleveland with a short side trip to Harrisburg, and my air fare happened to be $660. So hopefully we can do something about that, too.

Mr. Chairman, I am here to talk about some of the technology that has already been mentioned. We are not taking a position in the International Bridge, Tunnel and Turnpike Association on congestion pricing at this time. But again, we are here to talk about the available technology, some of which you have already heard about. You have heard it described here though as technology identified as automatic vehicle identification, or AVI. That term has been used several times here earlier this morning. We in the toll industry have found that that term is somewhat misleading, and we prefer to call that technology, for us at least, Electronic Toll and Traffic Management, or ETTM, to get away from what we have found is something of a hangup about automatic vehicle identification and the thought that such might involve an invasion or intrusion on privacy.

There have been many recent advances in ETTM technology involving the toll industry in recent years. This technology already allows participating drivers to pass through toll plazas without stopping and to pay their tolls electronically, either by prepaying with cash or by establishing a credit card account to be billed later. In those cases that are already in place, drivers who choose not to participate can go through a manual lane and pay the toll while these ETTM customers enjoy the convenience of hands-free, nonstop toll collection.

Some new toll roads being designed in this country are already being designed without the traditional toll booths in the main lines of the roads themselves. The ETTM customers, therefore, will be able to pass the toll points on the main line without stopping, without changing lanes, and those others who have to pay tolls manually will exit through a parallel service road. These systems have already a proven track record. You have heard about some of them already. For example, on the Dallas North Toll Road in Dallas, operated by the Texas Turnpike Authority, that system has been in operation and you, Mr. Chairman, talked earlier about not increasing capacity on our highway system. But in these toll installations, especially on that, that system already has proven that it can add the equivalent of two additional lanes of capacity through this system. I just want to show you——

Senator MOYNIHAN. Would you stay with us a moment on that? How do the two additional lanes of capacity come about?

Mr. JOHNSON. You heard earlier that the toll facilities, of course, do have the inconvenience of having to stop at the toll booths, and the congestion builds up. In those cases, you increase capacity by not having to stop.

Senator MOYNIHAN. Oh, the amount of cars going along would be the equivalent of adding another two lanes with booths. Got you.

Mr. JOHNSON. What I am holding up here happens to be the device, the transponder, that is placed in the windshield with that system. You can see it is a very small, simple device. The technology is improving constantly. This is the thing that is placed in the windshield, that communicates with the system. The Oklahoma Turnpike Authority, which is building four new toll roads, also has put into operation on several of their existing toll roads, a system that went into operation on January 1, and is receiving a tremendous favorable response from the public. There are currently some 17 other independent toll agencies in this country and State departments of transportation that are studying, testing and using ETTM systems. Furthermore, there are several cases where there are interstate and several interagency efforts underway. For example, in 1987, the toll authorities in the New York-New Jersey area formed an interagency policy committee to plan for the introduction of these systems in the region. Two of the agencies, the Port Authority of New York and New Jersey and the Triborough Bridge and Tunnel Authority, are conducting tests now to help determine the potential for regional use of this technology. As part of this test, they will monitor ETTM traffic at two facilities, which share a high level of commuter and other traffic to develop real time data on traffic flow and congestion.

In the same region——

Senator MOYNIHAN. I am very pleased to hear that, but I have to tell you that the specific energy that built those systems is distinctly absent from the present management. I would like to make this for the record, as a matter of fact, at the toll booth across from Manhattan out from Queens to get on the Triborough Bridge, about 15 years ago, the Triborough Bridge and Tunnel Authority, put down a series of big logs to channel traffic. They let them lay there and rot for 15 years. I was about to propose that they be made national monuments, as a symbol of our inability to paint a log. People built that highway, and people built Hellsgate Bridge. Now those were great engineers. But we can't paint a log. But they found that they have made a great innovative discovery. They have a chain, and if you have a chain, you can thread it through a post, and instead of a log on the ground, you have a chain at about four feet high. So we are getting there, showing our capacity to innovate, and the logs are said to be scheduled for removal in nine months. There goes another historical site.

I guess I meant to say to you, sir, that something is the matter, Singapore is doing it, Hong Kong is doing it, we are talking about it. I am glad to hear about Dallas and Oklahoma City. Forgive me for interrupting.

Mr. JOHNSON. I would like to say that in this same region through the efforts of Senator Lautenberg, during the last appropriation process funding was provided also for some traffic management programs in that area.

We will be providing to this committee a detailed summary of the ETTM systems and tests that are currently underway in this country and we will be doing that for this committee within two weeks. We believe through these efforts that this technology, which is already available, can be adapted to provide proven cost-effective congestion pricing systems, even though I say we are not taking a position on whether that should be done or not. Certainly that can help prove vital to many of our large cities, which will have difficulty meeting the air quality rules under the Clean Air Act. In addition to non-toll facilities, this technology is going to make toll projects more efficient. It will reduce congestion at toll plazas, lower toll collection costs, increase capacity, enhance audit controls, improve fuel conservation, contribute to cleaner air, and certain reduce frustration and time lost and provide greater service to the motoring public.

Some mention was made about some of the other systems throughout the world. I do want to say that just a year ago, I was in the Netherlands as part of a study tour to see what they were doing there. You have heard it mentioned already. Even a year ago, they were on the verge of implementing, or at least concluding the development of, the technology necessary to put in what they call a road pricing system around the cities or in the cities of Amsterdam and The Hague. I saw the technology, it was workable, they had not implemented it yet, and again I think it was for political reasons. But they are now, you have already heard, examining some other scaled down systems. There is no doubt, I say, that the technology is available, and these system will allow traffic to pass, you heard about the cordoned zones, or screen lines, at speeds that could approach 100 miles an hour. We certainly don't it want to be doing that, but the systems can handle traffic moving at speeds like that without stopping and without there being any of what I called earlier the identification. They can be virtually anonymous. So the technology is there, and I think the toll situations, especially in this country, are going to continue to develop this technology and it will be available to be adapted for these systems.

I might say regarding the parking that peak pricing in transportation is not new. You have it here in Washington on the Washington Metro system. On other rail systems you pay higher fares during certain hours, you pay higher parking fees in cities in central business districts during the peak hours.

At any rate, I would like to conclude on that, and try to answer any questions you may have. Mr. Chairman, we are very pleased to be here today.

Senator MOYNIHAN. Well, you are very good to be here. I note in particular that you represent the Association. I wish you hadn't gone from AVI to ETTM. That's what's killed us in this system. We put a license plate on those cars 70 years ago. Somebody objected to having a license plate. We have already identified those cars. It is no invasion of privacy to have electronic identification so long as there is no sign made by prisoners. That's a general point.

We look around and see other people ahead of us, being more inventive, although I thank you for the Texas thing. We are still collecting tolls on the New York State Throughway the way we did in 1955. We are collecting tolls on the Triborough Bridge the way we did in 1937. The whole point of the movement—the whole question of productivity back in 1988, I believe, the economic report of the President has a passage on productivity in transportation. I think it was rising at 0.7.

The whole question of productivity in the public sector is just lost to us. Does the National accounts put it down as zero?

All right. Dr. Pickrell, find out.

Mr. PICKRELL. I'm not sure I understand the question.

Senator MOYNIHAN. Does the National accounts assume——

Mr. PICKRELL. Assume there is no productivity growth in Government operations?

Senator MOYNIHAN. Yes, there's an answer. Would you have the goodness to find it, in your official capacity, even though you are here in your unofficial capacity?

Mr. PICKRELL. Sure. I can't tell you right now.

Senator MOYNIHAN. If you had to, if there was money due then, you could find out by noon, right? If there was economic incentive.

But we have very low productivity. We are still collecting tolls as we did 50 years ago.

Mr. JOHNSON. May I comment? I would agree that we probably are behind some of the other countries, especially in Europe and Japan, on these technologies. But we are, as a toll industry, serious about catching up on this, and I think we are making progress.

Senator MOYNIHAN. Let's credit the Administration for raising the subject, a taboo subject recently. We have created a great economic center based on no prices and free money. It has not gotten us very far.

Mr. JOHNSON. Smart card. I think it will come to that.

Senator MOYNIHAN. Good. And not made by prisoners. We would like to think about this. Let me just ask the panel if I can, one more question. We are also thinking of things like maglev and high speed rail, not as a substitute for road transportation, so much as a substitute for air transportation. The congestion over LaGuardia, National and O'Hare and so forth is equally real. We don't get a lot of ideas about it.

But how can it be that it costs fortunes to make short trips? Do you want to speak to that? What did you pay, $540 to come down?

Mr. MORRISON. I paid $450 to come down from Boston, about 50 cents a mile.

Senator MOYNIHAN. About 50 cents a mile. How did that happen? I think we should be at the level of some indignation. What is going on? We used to have, 30 years ago, a nice airline system in this country. Fifty cents a mile.

Mr. MORRISON. If you are asking about airlines, 50 cents a mile is partly because that is one of the highest fares. If I could have spent Saturday night, I could have paid $139. There are cheap fares out there.

But short-haul transportation by air is more expensive per mile than long-haul transportation. It is the nature of the terminal costs involved and the costs of take-off and landing.

Senator MOYNIHAN. The costs of getting the plane into the air. Once you are up there you can go a long way.

Mr. PICKRELL. It turns out that the wheel is a pretty good invention.

Mr. WINSTON. I just wanted to make another point to advocate broadening your perspective on the transportation pricing program, and that is to also now start thinking about airports. The exact principles we have been talking about today for auto congestion apply precisely to airport congestion. You talk about congestion in airports, we don't have congestion pricing at airports, either. That could do an awful lot to freeing up capacity that could certainly reduce delays, improve operations, potentially open up the possibility for new competitors, putting downward pressure on fares. We have weight-based landing fees that have nothing to do with congestion. So when you are talking about building new capacity to deal with "the airplane problem" we are back to square one. Until you can make use of the existing capacity we have now more efficiently through the pricing mechanism, it makes no sense to talk about building new capacity either for other modes or alternative modes. That would be just a huge waste of money.

Senator MOYNIHAN. Still, one has the right to rebel against the thought that it costs more money to get to Boston than to get to Guam.

Mr. MORRISON. One reason for that, though, that I should point out is that airlines catering to business travelers, like in Boston to Washington, tend to have lower load factors, percentage of seats filled. You can get a seat at short notice and the cost of being able to do that is that you pay a higher fare.

Senator MOYNIHAN. Mr. Morrison, stop defending those people.

[Laughter.]

Mr. MORRISON. The fares to Guam reflect very high load factors. I am not defending them, I am explaining.

Mr. PICKRELL. Could I comment? Could I follow up on Dr. Winston's comment on capacity? It seems to me we have ample evidence accumulated through the last couple of decades that illustrates exactly the point Dr. Winston has made. The Federal Government itself has invested over $20 billion in constructing new rail transit systems, very high capacity, high speed rail transit systems, in many of the Nation's cities over that time period, and will continue to invest substantial sums over the foreseeable future. These Federal expenditures have been matched by substantial State and local expenditures. Yet with the notable exception of the Washington Metro, these new systems are just dramatically underutilized, in part because we have failed to come to grips with the degree to which we subsidize the competing mode. It seems to me that this does not need to be made as a hypothetical point. It is demonstrably true in the urban arena.

Senator MOYNIHAN. We will be asking the Department of Transportation for information in that regard. So I would like to thank you all, thank you particularly, sir, for coming all the way from Berea. I want to thank our economists. I guess the quote of the morning has to be "If you build it, they will come." We thank you all.

We are going to have a panel consisting of Mr. Daniel Flanagan, President of the Flanagan Group, and Heather Ruth, who is President of the Public Securities Association, to speak to us on this general question we have been discussing, which is how do we finance an infrastructure system in a time when there are no monies, no extra monies available. The structural deficit is going to go on indefinitely.

Mr. Flanagan, you have been one of the most creative, thoughtful persons in this field. Ms. Ruth has to be—let's see, do you represent sellers or buyers?

Ms. RUTH. The intermediaries.

Senator MOYNIHAN. You have to decide whether they are worth selling and buying. So we will first hear from you, sir, and we welcome you. We will put your testimony in the record, and you proceed exactly as you like and for as long as you wish.

STATEMENT OF DANIEL V. FLANAGAN, JR., PRESIDENT, THE FLANAGAN GROUP, INC., ALEXANDRIA, VIRGINIA

Mr. **Flanagan**. Thank you, Mr. Chairman. Following on the earlier testimony from the earlier panel and presenting a path for infrastructure user fee progress, it is a pleasure to appear before the subcommittee today to present some recommendations based on four years of research coordinated with your subcommittee staff, yourself and other members of the committee and Congress.

Before I continue, it would be appropriate to thank the many organizations who at different times participated in our "National Infrastructure Conference" roundtable discussions. A list of those organizations is attached. I think we all recall the hearings held back in 1987 and 1988 under the umbrella clause of discerning what the status was, at the time, of our infrastructure needs. The subcommittee took the initiative by including the word "infrastructure" in its title, and sent a signal that the future was now, and that it was time to come to grips with this elusive public policy issue.

Senator **Moynihan**. Elusive, indeed.

Mr. **Flanagan**. In recent months we have heard over and over again the need to address infrastructure. In fact, Speaker Foley, in a recent address to the National Press Club, made it very clear that after the cessation of hostilities in the Gulf, it would be his intent to move to the domestic agenda, specifically to education and infrastructure.

Mr. Chairman, to be specific, the National Council on Public Works Improvements Report outlined in 1988 an entire menu of areas that needed attention. Your intent was to answer the fundamental question of what the Federal role should be in the future with respect to our Nation's infrastructure. I do remember you saying many times to various audiences that programs commissioned in the 1950's dealing with transportation and the like, specifically the Dwight Eisenhower-commissioned national highway network, have matured, and it is was now time to determine how to address the needs of the next century.

The Administration has come forth with their transportation proposals. This Congress will undoubtedly do the same, but will also be addressing the Clean Water Act, Resource Conservation Recovery Act, and other initiatives, which are intertwined with our Nation's infrastructure.

Mr. Chairman, in presenting this testimony today, I must tell you that it is primarily the result of four years of conversations which were conducted under the format of the ad hoc National Infrastructure Conference that was organized to respond to your question as to the future of the Federal role. As I mentioned earlier, there are many organizations which have contributed their time and effort and I think all of them are pleased to see that there is an opportunity to "throw long" and put a catalyst out there that will help move things along.

Indeed, it became increasingly clear to many of us, and as you spoke to a number of our audiences, that there was a certain momentum contained in existing programs, and that Congressional debate would determine how those programs would be updated to meet current need. To try and revamp all of this in the name of infrastructure would create confusion and unnecessary controversy. What I think was apparent to all was the need for something new and creative that would supplement these programs, and would bring together the Federal role of guidance, research, etc., with the State role of political consensus, and what I learned about this morning—pricing.

Let me express then some of the underlying rationale for supporting the establishment of a National Infrastructure Corporation, a legislative proposal that you, Mr. Chairman, have introduced in the lats two Congresses, and to underscore in that legislation the establishment of a congressional commission on Infrastructure Investment that will report to the Congress as to recommendations for the design of an infrastructure investment security that will satisfy the requirements of the Employee Retirement Income Security Act of 1984, ERISA as it's known, which I worked on many years ago, to allow pension funds to invest in such securities and generate, as a result, new investment in our Nation's infrastructure, a secure investment opportunity and construction jobs. This is a laudable objective that can easily be achieved.

The key focus of the Corporation, before I talk about the Commission, would be to assist dedicated State infrastructure revolving funds which qualify under criteria established by Congress. The concept is that State and local officials identify their priority infrastructure projects. They will then contact their regional National Infrastructure Corporation officials and look toward combining with them, on a 50–50 basis, to provide the interim financing for the nominated infrastructure project. Assuming it meets the criteria of innovation, high technology application, existing environmental requirements, etc., the project then is funded for its interim planning, design and construction phases, until such time as the consumer enjoys the service and pays the required user fee as described by the earlier panel. The Corps of Engineers will play its traditional role of monitoring the project construction on behalf of the Corporation.

Once the project is up and running with the selected user fee, the interim financing provided by the State and the Corporation revolving funds then returns to their respective parent agencies to be loaned again for new projects meeting the criteria.

The phenomena that has occurred, Mr. Chairman, in which I think we must focus attention on, is how to take the basic function of a publicly-accepted user fee and multiply its impact so that projects can move along speedily. What is obvious in today's budgetary climate is the fact that there is public consensus as to the need for certain infrastructure services to be financed through various user fee concepts.

We have seen in many States the creation of State revolving funds. This was commented on in your subcommittee hearings several years ago, as well. This trend should be encouraged as the Federal Government's role should be to supplement this development and to provide matching loans. So that projects, be it waste water treatment, hazardous waste removal, transportation, mass transit, etc., have a mechanism for allowing the planning, design and construction phase itself to advance. What appears to be happening now, Mr. Chairman, around the country, is that innovative planning and design are frustrated. They can see the user fee over the horizon and detect a public consensus for the infrastructure project, but they can't get far enough along to be bring it all together. Oftentimes the political consensus that is necessary at the State or local level really doesn't shape up because the projects themselves are too far down in the planning phase, and not visible enough for the public to make their preferences known. This delay causes significant cost increases which eventually force cancellation of the project. It happens all the time.

As a result, we have supported, as mentioned earlier, a new governmental entity to be named the National Infrastructure Corporation. The essential thrust of the Corporation would be with its initial seed capital to serve as a lending agency to match up with dedicated State infrastructure revolving funds that are qualified with the Corporation for 50–50 sharing in the interim funding, that is as I said before, the planning, design and construction, of qualified projects around the country.

Senator MOYNIHAN. That phase where the present pattern of delay ends up with nothing happening.

Mr. FLANAGAN. Nothing happens.

The Corporation should also have on its list of responsibilities the coordination of research and development, and the dissemination of such information. This came out over and over again in the hearings several years ago.

The method of selecting projects to be underwritten by the State and national revolving funds would have to have the State infrastructure revolving fund nominate a project based on their priorities. As you know, States and regions have very different characteristics, and as a result priorities will differ. If States do not establish such revolving funds, then they will not be eligible to participate in the program. When the project is placed on the National priority list for the Corporation's consideration it will be certified that the project can be built on budget and on time, and as soon as funds are available, having been brought back from these earlier funded projects, then those projects will be funded.

What we would have then as a result of the Corporation's existence, Mr. Chairman, is many projects around the country moving ahead based on these interim loans. The next question, of course, vis-a-vis the Corporation, is permanent financing, noting the existence of the user fee as the revenue source.

In the case of new projects when long-term financing is established, one of the issues we have struggled with is the following. In many instances, if not most, States and other localities will find their financing through the appropriate tax-exempt marketplace. The tax-exempt municipal bond industry has served the Nation's infrastructure very well these many years and will continue to do so. However, I want to underscore a critical point. Our most valued capital resource in existence in the United States today are, of course, our Nation's pension funds. Pension funds are already tax exempt and will not invest in such tax exempt securities at the lower yields.

Senator **Moynihan**. There you are at the fulcrum of the problem, aren't you?

Mr. **Flanagan**. That's correct.

Senator **Moynihan**. There is no incentive of any kind for a pension fund to have some tax advantage in its investment portfolio.

Mr. **Flanagan**. That is correct.

Senator **Moynihan**. If you were sitting on such a board, you would say how high a return can we get whilst being prudent?

Mr. **Flanagan**. That's correct.

Senator **Moynihan**. A General Motors bond could be as prudent an investment as an Ohio Turnpike bond. If I knew something about these things, I would own some of them, I suppose. But to have an extra 200 basis points in return, therefore as a prudent trustee, you would go to the bond and to the private not the public.

Mr. **Flanagan**. That's correct.

Senator **Moynihan**. That's really the crux of the decision process, or the allocation process, isn't it?

Mr. **Flanagan**. That's correct.

Pension funds are safeguarded, as you observed, by the fiduciary provisions contained in the Employee Retirement Income Security Act of 1984, ERISA. This legislation has served the Nation, its pension funds, and beneficiaries well and will continue to do so. Paradoxically, Mr. Chairman, there is a reservoir of capital highly desirous of helping answer the infrastructure challenge.

The problem in the past has been the last of an investment vehicle, the security if you will, that pension funds can purchase under the fiduciary requirements of ERISA for their portfolios that will have an impact on infrastructure.

Obviously, many of our pension fund beneficiaries are construction workers who would enjoy greater job opportunities if there was more activity in the infrastructure construction field, while having the additional benefits of a good investment return, as you suggest, and an improvement in their quality of life.

We have struggled with the issue long and hard, and I would like to repeat a request that you include in your National Infrastructure Corporation legislation a provision for a commission to report to the Congress before the end of this year as to recommendations on what needs to be done in this area.

I oftentimes think of what was done in the housing market by the GNMA program, founded by a good and valued friend, Ray Lapin, a fellow San Franciscan, who President Johnson nominated to head Fannie Mae years ago. Ray, a successful mortgage banker, had the brilliance to design the GNMA program while he was at Fannie Mae. The rest is of course history.

What we want to design is an infrastructure GNMA, if you will, that pension fund trustees can put into their portfolios, with the knowledge that it will help move our infrastructure process well along, provide the kind of permanent financing that is necessary, and be a secure and attractive investment for pension portfolios.

Mr. Chairman, in conclusion it is worth noting that the budget restrictions that Congress is now so familiar with argues for some new approach. The basic design here is to recognize that dilemma. The Committee, when it considers the creation of the National Infrastructure Corporation, obviously will want to make some changes. They should feel comfortable in noting that the Corporation is a sustaining entity that with the initial capital interest as it makes loans, and upon repayment of those loans will then be in a position to invest elsewhere across the country. I think it will be an exciting time, it will lead to local initiatives, and local debate and consensus. More importantly, it will lead to new technologies, including user fees, be they MBIs or ETIs or whatever.

Ms. RUTH. ABCs.

Mr. FLANAGAN. It does not give us all the answers. These will evolve over time. But the Corporation gives us the building blocks.

Thank you, Mr. Chairman, and I would be pleased to answer any questions.

Senator MOYNIHAN. Thank you, Mr. Flanagan. Let us note that your infrastructure conference participants were the American Public Works Association, the National Society of Engineers, the National Utility Contractors Association, the Public Securities Association, the American Society of Civil Engineers, the American Planning Association, the Construction Industry Manufacturers Association, the Water Pollution Control Federal, Construction Industry Institute, and the Building and Construction Trades Department.

Ms. Ruth, good morning. What do you think of all this?

STATEMENT OF HEATHER L. RUTH, PRESIDENT, PUBLIC SECURITIES ASSOCIATION, NEW YORK, NEW YORK

Ms. RUTH. Good morning, with five minutes to go. My name is Heather Ruth, and as you noted, I am President of the Public Securities Association. As you asked the question, I will describe exactly who we are. PSA is the international trade organization of banks, dealers and brokers that underwrite, trade and sell the securities of American States and local government, mortgage securities, money market instruments, and U.S. Government and agency securities.

PSA's member firms account for at least 95 percent of the Nation's municipal securities underwriting and trading, and we also include all the primary dealers in Government securities as recognized by the Federal Reserve Bank of New York and all major dealers and mortgage securities, including GNMA, Federal agency securities and money market instruments. I read you this in great detail merely to make the point that if there is to be any security, fixed-income security, which is financing infrastructure, taxable or tax-exempt, chances are it would be our members who would be underwriting it.

Senator MOYNIHAN. Help me—when you say "underwrite" does that mean the process by which a firm says we will take $100 million worth of these from you and undertake to sell them?

Ms. RUTH. Yes. It is that intermediary function, to buy on one hand, and then make one's profit by selling to investors on the other hand.

Senator MOYNIHAN. I have often wondered if there is any risk in that enterprise.

Ms. RUTH. Oh, yes, there is. But on average, hopefully the profit is greater than the risk of loss, or we would not be in business.

There are plenty of examples of losses to offset the gains, particularly in times of interest rate volatility. If you buy today at X and the market is Y tomorrow, you are in trouble.

I am really pleased to be here this morning to testify on the role of the capital markets in infrastructure financing, and about how the Federal Government might better assist State and local and private financing of infrastructure related projects. I commend you, Senator Moynihan, and your subcommittee, for holding this hearing.

I will refer to the written testimony which has been submitted where I also point out that I am a sometime public official.

Senator MOYNIHAN. You were on Big Mac, weren't you?

Ms. RUTH. I was the executive director.

Senator MOYNIHAN. You survived.

Ms. RUTH. And I am currently on the city's financial control board, together with the four top elected officials of the city and State of New York.

Senator MOYNIHAN. I am sorry to hear that.

Ms. RUTH. Well, I want to make it clear to them in particular, that I am not here representing them.

In any case, the bulk of responsibility for financing, building and maintaining our Nation's infrastructure has traditionally fallen to State and local governments, as has been recognized. Most of the Nation's secondary roads, bridges, water and sewer systems, airports, public schools and other projects defined as infrastructure were planned, financed and built by States and localities.

It is true that the Federal Government still plays a significant role in financing infrastructure by providing assistance to State and local governments through construction programs for surface transportation, water, airport, and environment. But ultimate responsibility for building and maintaining infrastructure projects almost always falls to State and local governments themselves.

The most important tool States and localities have in financing infrastructure investment is the tax-exempt bond market. The interest on State and local government bonds issued to finance public projects is generally exempt from Federal taxation for most investors, and often also exempt from State and local income taxes. Investors therefore require a lower yield on their securities than they would if the interest were taxed. State and local governments receive the benefit of the lower interest——

Senator MOYNIHAN. You said require. Your text says demand.

Ms. RUTH. Yes, indeed. I thought require perhaps might explain it better.

Senator MOYNIHAN. Right.

Ms. RUTH. As in, they do not require a higher one.

Seldom are individual investors in the position of demanding anything, but the market demands.

Senator MOYNIHAN. Got you.

Ms. RUTH. The Federal Government forgoes tax revenue on State and local government bonds as a means to assist bond issuers and to encourage public investment. Tax exemption of municipal bonds is one of the most important sources of Federal aid to State and local governments.

A specific illustration will show hoe important the tax exemption is in reducing infrastructure costs to State and local governments. All jurisdictions in my home State of New York issued a combined total of more than $17 billion in long- term tax-exempt bonds in 1990, a substantial portion of which were financed infrastructure projects. A difference of just one percentage point would save New York issuers $170 million in interest costs annually, or $2.6 billion in total interest cost over the 15 year average life of these bonds, just on the bonds issued in 1990.

The actual market interest rate differential for issuers in New York State is probably closer to two percentage points, measured off the comparable corporate taxable rate. If so, the savings are doubled, say $5 billion over the life of the bonds issued in any one typical year. Similarly, we could calculate the interest savings for any State or locality. Nationwide, the interest savings realized by issuers due to tax exemption for 1990 issues alone would be $38 billion.

In addition to the interest cost savings, tax-exempt bonds offer a number of other advantages to State and local governments, the ability to pay for large projects over a number of years, flexibility and latitude in managing their financing, and a market test of public projects, among others. Municipal securities may be secured either by the general taxing power, the full faith and credit of the Government, in which case they are often called general obligation bonds, or by specific revenues, generally user fees. This morning we have been talking about various new imaginative ways of using user fees in certain kinds of infrastructure projects, and I should say that in general revenue bond financing, that kind of financing which is based on user fees rather than general tax revenue, has been becoming an ever larger proportion of the market for tax exempt bonds for quite a number of years.

Senator MOYNIHAN. Would you have the goodness to send us, if you have a little number of those——

Ms. RUTH. Absolutely. In fact, we could not only do it nationally, but by State, if that would helpful.

Senator MOYNIHAN. Yes.

Ms. RUTH. Because there are different patterns by State.

The most attractive feature to investors of municipal bonds is their tax exemption. Consequently, as has been pointed out, only taxable entities invest in municipal securities. Tax exempt entities, such as pension funds, do not participate in the market, because they have no economic incentive to do so.

Senator MOYNIHAN. That's Mr. Flanagan's point.

Ms. RUTH. Exactly.

Interestingly, traditional institutional investors in the municipal market, commercial banks and property insurance companies, so-called P&Cs, have significantly reduced their participation in the municipal market since the Tax Reform Act of 1986. Indeed, banks have been net sellers of municipal bonds in every year since 1986. This leaves the market for tax-exempt bonds today dominated by individual investors, either investing on their own or through proxies.

Senator MOYNIHAN. Hold there a second if you will. As you recall, earlier I mentioned that at least four members of this committee are members of the Finance committee, and we were much involved of necessity in that 1986 legislation. What did we do that had that effect? I don't remember. I remember intending it.

Ms. Ruth. It is interesting that you say that, because in fact many of these provisions were not in fact in the bond section of that Act, but rather in the corporate tax section of that Act. It was often difficult to get people to look at the two of them together.

Let me tell you precisely what the changes were, affecting both banks and property and casualty insurance companies, as well as other corporations, was the alternative minimum corporate tax. That had the effect, in other words, to any corporation, as opposed to individual, most municipal bonds are only partially tax-exempt, and therefore need to be compared against Treasuries and other corporate bonds and other sources of investments. That affects both banks and P&Cs.

There is an other provision that specifically affects banks. That is the loss in the Tax Reform Act of 1986 of the 80 percent deductibility of carrying charges for purchases of municipal bonds. I think both of those provisions, in our judgment, were very important to banks. It has been banks, who have actually on a net basis disinvested in municipal bonds since 1986, whereas P&C insurance companies have really reduced the rate at which they have acquired them.

Senator Moynihan. I see. That disinvesting—has there been some rise in the interest rate as a consequence?

Ms. Ruth. The overall municipal tax-exempt rate as a proportion of the Federal—T-bond or whatever—has risen.

Senator Moynihan. It has risen? Perhaps you could let us know that, also.

Ms. Ruth. Yes. I would be glad to. There is one other thing I should point ut, because you and your colleagues did provide on recognition, if you will, of the prediction that this would be a problem for issuers with respect to banks and did provide that issuers of bonds who issued no more than $10 million a year would be eligible for purchase by banks with the deduction of carrying charges. There have been proposals that that number be raised from $10 million to $25 million.

Senator Moynihan. I remember at that time, however, and I could be wrong, but I remember we did have a problem with getting banks to pay any taxes at all. We may have that problem yet again.

Ms. Ruth. Ironically, this is a problem that is sort of independent of how much they pay, in that from their perspective, if it is not to their economic advantage, they merely buy other bonds. So there is an impact on State and local issuers, even though they will behave in a way to maximize their profits, the after-tax profits, because that is what they are supposed to do, make money if they can.

In any case, State and local issuance of the tax-exempt bonds is regulated under the Internal Revenue Code. In general, most public projects can be financed with tax-exempt debt. Where there is an element of private participation in the project, however, rules for issuing tax-exempt bonds are more strict. Since they were instituted in 1982, in 1985 and significantly tightened in 1986, restrictions on private activity bond financing have hurt the ability of States and localities to work in partnership with the private sector to devise innovative solutions to problems in financing infrastructure.

I understand that the committee is considering legislation to establish a Commission as suggested by Mr. Flanagan and his colleagues to study the feasibility of creating a new financial security that would attract pension fund investment in America's infrastructure. I commend the subcommittee's attention to surrounding infrastructure financing and to your consideration of alternative policy schemes. At the very least, a commission to study infrastructure financing alternatives would attract national attention to issues surrounding public investment. However, I would like to recommend that the scope of the Commission not be limited simply to the creation of a new infrastructure security, but be expanded to include any number of policy alternatives related to infrastructure financing. Hopefully, the Commission would be successful in setting forth innovative schemes for infrastructure investment that would include all levels of Government, as well as the private sector.

I appreciate the jurisdiction of this subcommittee does not extend to the provision of the Tax Code that prevent State and local governments from using tax-exempt financing to the extent they otherwise might.

Senator MOYNIHAN. That prevents State and local governments—how do we do that? May I say that the pattern I have never defined, but these are these four A committees and then a B committee, and the people on the A committees tend to be as a group on the B committee. There are really more finance committee members here than you would ever expect.

Ms. RUTH. It is nice to have you on both.

Senator MOYNIHAN. Yes. What do we do that limits them from using tax-exempt financing?

Ms. RUTH. There are a number of things. Perhaps the most important is that there is a list of projects which some people would regard as infrastructure which are not permitted to be financed at all.

Senator MOYNIHAN. And you are going to tell us what they are? Not now, but——

Ms. RUTH. Exactly. It is a pretty fulsome list in the written testimony. For the most part, however, I would say— there are some exceptions. For the most part that is not the principal constraint to tax-exempt financing with respect to infrastructure projects as opposed to some other kind of public policy projects.

Senator MOYNIHAN. Yes, we have a public interest in saying that we don't let the tax-exempt status of these bonds flow to private activity.

Ms. RUTH. Right. This is really the issue. Where the private participation in any given project exceeds 10 percent of the value of the project——

Senator MOYNIHAN. That's it.

Ms. RUTH. Well, the State caps, as well. At this point, there are quite a number of States which are close to or at bumping up against their maximum cap allocation for private activity bonds.

In any case, given the historical success of the tax- exempt bond market in financing our Nation's infrastructure, I believe the Commission, if established, would be remiss if the scope of its study did not include an examination of how State and local governments use tax-exempt financing, how it might be expanded to encourage even greater levels of public investment. I guess that's the point you have been making by saying that one did not necessarily exclude tax code considerations from the scope of such a commission.

Given such a mandate, PSA would be grateful for the opportunity to offer its full support and participation in the work of the commission. The capital markets, as you know, play a major role in financing infrastructure, and I am certain PSA's membership and our staff could make significant contributions to the Commission's work.

Thank you for this opportunity to testify, and I will be happy to answer any questions.

Senator MOYNIHAN. The first question is would you be a member of this Commission?

Ms. RUTH. If my members permitted me, of course.

Senator MOYNIHAN. That was very eloquent.

Ms. RUTH. Thank you.

Senator MOYNIHAN. Can we talk a little bit about this question of ERISA and pension funds? Since Mr. Flanagan has sort of identified that as a problem, do you agree with him? I think it is in your testimony.

Ms. RUTH. Yes. There is no doubt that the current investor base for tax-exempt finance is not only more limited than it used to be before the 1986 Tax Reform Act, and that it is finite, so that while it hard to argue that any issuer right now is not financing something principally because of lack of demand, there is a good deal of concern about inadequate demand to cover all market conditions, volatile interest rate conditions, for example, and to have a healthy secondary market, as healthy a secondary market as there was when banks and insurance companies were really making up a significant part of the market.

Senator MOYNIHAN. I know the New York State Thruway bonds interest was 1.85 percent.

Ms. RUTH. That was a long time ago.

Senator MOYNIHAN. Yes. A long time. What do we know about ERISA? It set a lot of limitations. Has it had the effect of limiting the number or proportion of workers covered by pensions?

Mr. FLANAGAN. ERISA is primarily drafted to address the private sector pension fund industry. It breaks down into many segments. You have your single employer plans and the multi-employer plans, which are more commonly identified with the building and construction trades side of the AFL-CIO, for example. The ERISA statute has stood its test in good form. It has done a fine, fine job. I don't think any one would ever suggest that it needs to be tinkered with. The problem is, under the fiduciary requirements of ERISA, trustees cannot find an investment security out there in the marketplace that will give the kind of yield with the kind of security that can be addressed to infrastructure. What you have are major infrastructure projects that are commonly designed in the hundreds of millions of dollars that have yet to be refinanced in a way—and I will use the analogy of the GNMA program, it came along at a similar time, when we were looking for liquidity in the housing market. Ray Lapin came up with this idea of secondary markets, a Government guarantee based on a very low risk, because you had a portfolio of mortgages, and we are not sure. That's why the Commission is a good idea. We need to create a way, a portfolio of infrastructure project or issues that perhaps could have a Government guarantee and a yield that would satisfy the fiduciary requirements. So ERISA is fine, it is doing a good job.

Senator MOYNIHAN. How does the yield arise?

Mr. FLANAGAN. The concept of the GNMA project, when Ray and I used to go out and talk to pension funds in 1972 and 1973, they really did not understand what we were talking about in those days. But the concept was a corporate yield, or a yield commensurate with corporate bonds. The Government guarantee was a few basis points below the corporate bond, but with the Government guarantee, that was enough to make it a very attractive investment for institutional investors, pension funds, and the like. The volume of GNMAs has been phenomenal.

Ms. RUTH. In fact, it is slightly—not the volume, but the interest rate tends to be slightly above Treasury's, so it is doubly attractive, because it has the same security.

Mr. FLANAGAN. Right.

Ms. RUTH. But in the case of GNMAs, what was invented was a secondary market mechanism on top of a taxable interest rate. It turned out not to be a security, it happened to be a loan. But it turned out—it took a taxable loan rate and then turned it or permitted the turning of that into a taxable security. In the case of infrastructure financing, what we are doing, essentially pension funds on the one hand have the same problem banks do, as we were discussing earlier. They have the obligation to invest for as good a yield as possible, and when they look at a tax-exempt yield it is simply too low. The same reason why banks today are not buying tax-exempt issues.

But if you look at it from the issuer's perspective, which is more like looking at GNMA from the housing market's perspective, what you find is an issuer who wants to build a bridge. He goes into the store, there are two bridges on the shelf. They are the same size, the same shape, they were built by the same manufacturer, they are exactly and absolutely identical. One has a price tag of 10 on it, and the other has a price tag of 8. So long as the one that has the price tag of 8 is on the shelf, the issuer will buy the cheaper bridge, if he is getting exactly the same thing.

And so long as the project in question is eligible for tax-exempt finance, if it needs a State capital allocation, and the allocation is available, if it meets all the current requirements from an issuer's perspective, State and local government perspective, there is no reason to want to issue that at 10 percent if you can do it at 8 percent. So you have to come up with, to make issuers interests and pension funds interests match, you have to figure out a way to make up that two percent, or you have to look for projects that currently are not eligible for tax-exempt finance. Is that fair?

Mr. FLANAGAN. I agree. I think it is important to emphasize that the pension funds asset base that is out there in the United States today is absolutely enormous. It does not connect up with our infrastructure needs. Most of the testimony that was given in years past has been about the enormous infrastructure needs that are existing in the United States today. When we decided as a Nation that we would allow a deductibility for a pension fund contribution by the parent sponsor, the employer, because that is a business expense, when he makes the contribution, we made a similar decision when we decided to subsidize at the Federal level the tax- exempt bond market. But the point is that we have so many billions of dollars contained in our pension funds. We need to look at that in terms of infrastructure. They need to match up. There needs to be a linkage there where they can make an investment.

Ms. RUTH. Yes. And that's a good reason, quite frankly, for the Commission, if broadly defined, because it could look at how you make that match.

Senator MOYNIHAN. All right. I think you've got yourself a Commission, Dan Flanagan.

Ms. RUTH. If broadly defined.

Senator MOYNIHAN. There is no point in asking a bunch of able people to get together and narrow their focus. This is a general issue.

ERISA does not allow investment for purposes of social goals, does it?

Mr. FLANAGAN. No, and they have been approached—research pension funds are approached by investing in infrastructure projects. You just can't go out and put $50 million of a pension fund into some new highway somewhere. You don't buy a highway. You have to convert it into a security of some sort that the trustees of the fund will find acceptable.

Senator MOYNIHAN. One day one of you, or some kindly soul, is going to explain to me how loans become securities.

Ms. RUTH. We would love to.

Senator MOYNIHAN. The transubstantiation is a little bit of a mystery to me.

Mr. FLANAGAN. Mr. Chairman, I am delighted about the Commission concept. I do want to emphasize again the Corporation concept as well.

The interim funding mechanism is very important. You heard that testimony this morning about technology, user fees, etc. As I said, many projects never happen because you just can't get there. You need that interim loan to get the funding, the planning, the design, to move along. Then the public says, in their locale, I like the project, I see how it will benefit me in immediate terms, and they are then willing to accept the user fee, whatever it is.

Ms. RUTH. Actually, with respect to the issue of innovation and the degree to which the private sector is important in that respect, whether one is talking about Mr. Flanagan's proposed new security or talking about relaxing the restraints on tax-exempt funding for joint ventures, essentially, between the public and private sectors, it is truly true that in any area that involves rapidly changing technology, some risk associated with the eventual acceptability of the technology, that the private sector involvement has been found to be very useful. That is a case which is now restrained, if you will, from tax-exempt finance and could be promoted either by loosing some of those restraints or by taxable financing.

Senator **Moynihan**. All right. I think this is the last of our hearings, not the last of our discussions. We have been trying to find a theme for this new era of public infrastructure, in particular road transportation. I think our theme is deficiency. I think the era of the interstate system was in some sense a profligate era. It gave away money free to produce a spurious national defense purposes, rockets don't travel by truck, they travel on their own propellant, as we have learned.

Whatever it was, it is over. No one is doing it in our cities, no one is spreading out and so forth. The fact of congestion does not prove the inadequacy of the system. It proves the inadequacy of the pricing. At least that's the first case to be—you have to disprove that fact before you pour more concrete. Our infrastructure needs go well beyond eight-lane highways, obviously. We have the Clean Water Act itself to start there. Learning this, teaching it, finding out how it can work, is a question. But there is also a big question that just increasingly interests me of productivity in the public sector. I don't know why, just because as a youth, I watched the opening of the Triborough Bridge. I thought I was making some discovery by counting the number of cars that went by.

Men and women who take those tickets, as they did in 1937, are still taking them in 1991. They don't build the cars that way, but they collect the tolls that way. There is zero increase in efficiency, as I say. I wish somebody would say something to the Port Authority. Would you tell them that they just caught me in the nick of time? I was going to introduce legislation to make those logs national memorials.

Ms. **Ruth**. Actually, I don't want to direct the comment to one or the other of my friends at both institutions, but I think it is the Triborough.

Senator **Moynihan**. Yes. They are not as old, and therefore not as sensitive to national monuments like rotting wood. What do the Japanese think as they are arriving from Kennedy Airport and see that stuff? You would not catch it in Bombay, they wouldn't allow it. But in New York?

Ms. **Ruth**. I assure you I will mention it to both of them.

Senator **Moynihan**. They couldn't see it. They must have gone by it for 15 years, and didn't see these rotting logs.

Ms. **Ruth**. Actually, you have finally explained to me why there are there. I didn't realize why they were there.

Senator **Moynihan**. You saw them?

Ms. **Ruth**. Yes.

Senator **Moynihan**. I hypothesize why they are there. I am perfectly willing to accept the thought that this being a Government agency, someone saw them there and assumed there was a purpose, whereas they got there absolutely randomly, they fell off a truck. But someone said there must be a regulation, so 15 years later, they are there.

The idea of productivity increase in the public sector has got to get to us. Or else we won't be able to do anything that needs doing. But that is just a pronouncement. Nobody needs to agree or disagree. I know that the members are going to be very grateful for your testimony. You are on our agenda, and we thank you very much.

Ms. **Ruth**. You are welcome. We will send your staff additional data.

Senator **Moynihan**. Thank you for coming down. How much did it cost?

Ms. **Ruth**. It was the regular shuttle flight, and I guess I do it frequently enough, it is up to $110 again, or $110, it may even be up to $145.

Senator **Moynihan**. Well, it costs four times as much to come from Boston. So you can count your blessings.

Ms. **Ruth**. At one end or the other, I have to take it. It doesn't matter.

Senator **Moynihan**. Thank you very much.

Ms. **Ruth**. Thank you.

Senator **Moynihan**. We thank all of you, we thank our recorder, we thank our staff, and our last hearing on the Highway Surface Transportation Act of 1991 is concluded.

[Whereupon, at 12:35 p.m., the subcommittee adjourned, to reconvene at the call of the Chair.]

[Statements submitted for the record follow:]

Statement of

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before the

Subcommittee on Water Resources, Transportation, and Infrastructure
Committee on Environment and Public Works
U.S. Senate

March 21, 1991

Is highway congestion an immutable fact of modern urban life? Sometimes it seems so. No matter what we do, millions of people waste thousands of hours each day while they go about their daily business. At the same time, the ability of governments to meet this challenge is reduced because their budgets are already overburdened with many competing needs.

Our highway congestion problem has the same basic cause---although a more ready solution---as the long lines we see in news reports from the Soviet Union. Both reflect shortages induced by prices set too low. The price system, which we rely on to ration nearly all the goods and services in our economy, is usually ignored in seeking solutions to highway congestion.

Users already pay a large share of the cost of roads through state and federal taxes on gasoline. These taxes served us well when roads were uncongested, but in today's congested environment they come up short. Because the demand for highways is very time and place specific, gas taxes are simply too blunt an instrument to ration scarce peak-hour highway capacity effectively.

The price system works when the price of a good reflects the cost to society of producing it. When prices equal cost, consumers receive all goods and services that they value more than the cost to society of producing them. Society has rules---antitrust laws---to prevent prices from rising too far above costs, because of the inefficiencies that result. Sometimes the opposite occurs and prices fail to reflect society's full production costs, pollution, for example. Here, some of the costs of production are not borne by firms, but are borne by the public at large.

In this respect congestion is no different from pollution. Drivers take into account only those costs that they bear. They do not consider the costs of delay that their trips impose on others. Congestion tolls are specifically designed to make drivers take into account the cost they impose on others.

Rather than use price to ration highway capacity, we try to reduce congestion by building new roads, using high occupancy vehicle (HOV) lanes, subsidizing transit, etc. But as experience has shown, these approaches founder on their own success---soon, highways are as congested as before. Why? Because most people prefer driving to other modes, congestion itself limits peak-hour automobile use. When a policy initially reduces highway congestion, travelers switch from other modes, other routes, and other times of day until congestion is as bad as before. In other words, if you build it, they will come.

This is not to say that these measures offer no benefits. But using congestion as a rationing mechanism is inherently wasteful. One driver's delay does not enrich someone else, it simply wastes time. If price were used as the rationing mechanism, my toll payment equals the government's toll receipt---no resources are used in the transaction (except the cost of setting up and operating the collecting mechanism). Drivers who impose more costs on society than they value their trip are priced off the road.

Congestion pricing has been tried in Singapore and in Hong Kong. Starting in 1975, a windshield sticker has been required to enter the central areas of Singapore during morning rush hours. This policy reduced traffic by about 25 percent. Estimates of the benefits exceed the costs. From 1983 to 1985 Hong Kong ran an experiment with electronic road pricing in which test vehicles were equipped with "electronic number plates." When a vehicle passes a toll point, the electronic number plate transmits a unique identification number to a computerized receiver that stores the information. The vehicle's account is charged for a predetermined number of units, depending on location and time of day, and a bill is sent to the vehicle's owner at the end of each month. Although Hong Kong's government decided not to pursue the scheme, technologically it was a success and the benefits were fourteen times the cost.

Although highway congestion pricing has not been implemented in the U.S., several studies have estimated the level of congestion tolls necessary to achieve the right amount of congestion and the benefits that would result. Estimates range from 10 cents to $1 per car per mile (1991 dollars) depending on existing conditions, with an attendant reduction in peak-hour traffic between 10 and 25 percent. A rough estimate of the benefits of implementing such pricing nationwide is around $8 billion (1991 dollars).

What about the assertion that congestion tolls hurt the poor? Whether the poor suffer from congestion pricing depends on how the government spends the toll revenue. For example, congestion toll revenue could be used to subsidize mass transit, which would benefit the poor. Only a distinctly pro-rich use of the toll proceeds would leave the poor worse off.

Taxes, tolls, and user fees serve two masters. On the one hand, they raise needed revenue. On the other hand, they influence the allocation of resources. Sometimes these goals are in conflict---for example, tolls on uncongested highways and bridges. But for congested highways, tolls designed to ration highway use would raise the revenue needed to build and maintain the highways---gas taxes and registration fees would no longer be needed.

It is perhaps premature to suggest that congestion pricing be introduced en masse, but it is time for some well developed, visible experiments to guide policy makers toward the next step.

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A SURVEY OF ROAD PRICING

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Abstract—Road Pricing has an established history in the literature of transport economics and has attracted the intermittent attention of policy-makers for many years. The theory has been refined and developed as economists have relaxed the simplifying assumptions of their early work. This paper brings together the wide-ranging literature on road pricing, drawing not only on the standard economic sources but also material that has appeared in the engineering and planning literature. The theory is set in the context of both empirical evidence of the practical viability of road pricing and the political-legal environment in which it must gain acceptance.

INTRODUCTION

The pricing of roads to reduce traffic congestion has been of interest to economists for many years. During the early 1920s, the debate between Pigou and Knight focused on road pricing. At that time, however, the issue of road pricing was used to illustrate the concept of social cost within the framework of a much broader disagreement about the efficiency of private enterprise. Road pricing was not offered as a viable policy to address a specific social concern over excessive congestion. Over the years, however, as congestion problems became more widespread in cities throughout the world, the interest in road pricing as a policy measure increased.

This paper surveys the theoretical and empirical work on road pricing. In the context of this paper, road pricing refers to schemes such as central area licenses, per mile charges, etc., designed to reduce urban traffic congestion. Other motivations for pricing roads, such as for cost recovery or for maintenance, are mentioned only in passing, if at all. This survey stresses the current status of economic research in road pricing through selected references to recent works and does not attempt to provide an encyclopedic litany of research in the area.[1]

This paper is organized as follows. The next section lays out the foundation for the theory of congestion tolls. The third section surveys empirical work, including estimates of optimal congestion tolls and the associated welfare gain, as well as assessments of the distributional implications of road pricing. Legal and political issues that impede implementation of road pricing are assessed in the fourth section, along with a discussion of the actual implementation in Singapore and the proposed implementation in Hong Kong. The last section contains a brief summary and a final assessment.

FOUNDATIONS

The simplest and perhaps best understood traffic flow situation is called uninterrupted flow and takes place on the portions of expressways well removed from "conflict points" such as on- or off-ramps (Institute of Transportation Engineers, 1982, p. 476). On non-expressway facilities in urban areas, the flow is usually interrupted by "frictions" from intersections, pedestrians, etc. Because models of interrupted flows are more complicated than those for uninterrupted flows, congestion problems on non-expressway facilities have received much less attention from economists and others.

The starting point for deriving the relationship between highway congestion cost and usage for uninterrupted flow conditions on expressways is the relationship between speed and density. Although Haight (1963, p. 72) refers to the volume-density diagram as the "fundamental diagram of road traffic," the speed-density diagram is perhaps a more intuitive starting point. Figure 1a shows that, as the density of vehicles increases, the speed at which they travel decreases. Although a linear relationship is shown in the figure, the Highway Research Board (1966, p. 69) notes that "the weight of evidence appears to support a nonlinear speed-density relationship within a density range of 20 to 160 vehicles per mile. The difference is, perhaps, of greater theoretical than practical significance at present."

The speed-flow diagram can be derived from the speed-density diagram based on the relationship Flow = Speed · Density, i.e., the flow of vehicles at a given speed is indicated by the area of the appropriate rectangle under the speed-density graph. Part b of Fig. 1 shows this relationship. In the upper portion of the curve, as flow increases, speed decreases until maximum flow is achieved at what is called the "critical density."[2] Beyond this point, increased flow is not possible. Attempts to increase flow result in increased density and reduced flow, as represented by the lower portion of the speed-flow curve.

The speed-flow curve is of paramount importance in highway engineering. However, for economic analysis, the relation between cost per user and flow (output) is central. Although vehicle operating costs do vary with

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[1] Thomson (1977) and Meyer and Gómez-Ibáñez (1981) offer a broader perspective on urban transportation problems.

[2] The maximum flow of vehicles attainable depends on many factors, such as the grade, curvature, etc., of the highway, as well as on the mix of vehicle types. As an indication of the magnitudes involved, the capacity of a multilane highway under ideal conditions is considered to be 2000 passenger vehicles per hour per lane (Highway Research Board, 1966, p. 76). The speed at maximum flow is around 30 miles per hour.

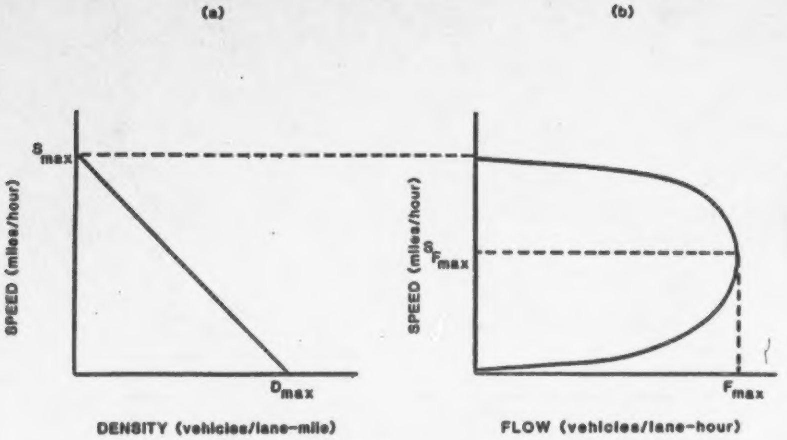

Fig. 1. Derivation of the speed-flow curve.

speed, the most important effect of congestion is the cost associated with increased trip times.[3] In assessing these costs, information on the value that travelers place on their time is necessary. Although placing a value on time is considered controversial in some circles, the decisions that individuals make when faced with choices involving different combinations of time and money reveal that they do place a value on their time. For example, using a disaggregate mode choice model based on utility maximization, the coefficient of time can be divided by the coefficient of price to estimate the value of time.[4] Although the results of statistical studies vary, Beesley (1973) reports that it appears that individuals value (in-vehicle) travel time at not more than one-half of their wage. For a more concrete example, the American Association of State Highway and Transportation Officials (1977) recommends that in-vehicle time savings be valued at $0.21 per hour for savings less than 5 minutes, $1.80 per hour for savings between 5 and 15 minutes, and $3.90 per hour for savings in excess of 15 minutes (values expressed in 1975 dollars).

Time per mile is obtained from the speed-flow curve by inverting speed as shown in part a of Fig. 2. Multiplying time per mile by the value of travel time and adding vehicle operating costs (dollars per mile) gives the cost-flow relationship labeled AVC (average variable cost) in Fig. 2b. Also shown in the figure is the short-run marginal cost curve (SRMC) reflecting the extra cost of adding a vehicle to the flow. The SRMC curve approaches infinity as flow approaches capacity, because a greater flow is impossible.

Having explained the technological underpinnings of the cost curves, it is now possible to develop the basics of the theory of optimal congestion tolls. A graphical description is below. The appendix contains a mathematical derivation of optimal pricing *and* investment. Although Ellet (1840) and Dupuit (1849) addressed the issues of pricing and investment of transport facilities many years ago, the approach presented here can be traced to the works of Pigou (1918) and Knight (1924). In Fig. 3, a demand curve, representing willingness to pay for various quantities of trips, is added to the cost curves in Fig. 2b. The backward bending portion of the AVC curve is not shown because the optimal flow will never occur in this region, since the same flow can be achieved at lower cost. In the absence of any toll, equilibrium occurs at Q_e where the demand curve intersects the AVC curve. Thus, any user who values the trip at more than the cost he bears, travels. However, at this point, the extra cost to society, i.e., including other users, exceeds the benefit derived by the last traveler. The same is true for all trips beyond Q*. The amount by which the additional cost of these Q_e-Q* trips exceeds the additional benefits is shown by the shaded area in the figure. This area represents the welfare loss from non-optimal pricing. In order for equilibrium to occur at the optimal quantity Q*, a toll, *t*, must be imposed. This toll equals the congestion externality, the difference between the cost the traveler imposes on society (SRMC) and the cost he necessarily bears (AVC).

EMPIRICAL WORK

Optimal tolls and welfare change

The thrust of empirical work in road pricing has been to estimate optimal congestion tolls and the gain in welfare that would result from their imposition. According to Winston (1985), this type of empirical analysis has been possible because of major developments during the last few decades of analytical tools, as well as stronger analytical foundations for the normative analysis of op-

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[3] Keeler and Small (1977) report that, as a first approximation, vehicle operating costs are proportional to fuel consumption. However, over the range of plausible optimal rush-hour speeds, fuel consumption is essentially constant.

[4] See Winston's (1985) survey of the transportation economics literature for a more general discussion of the value of time in transportation.

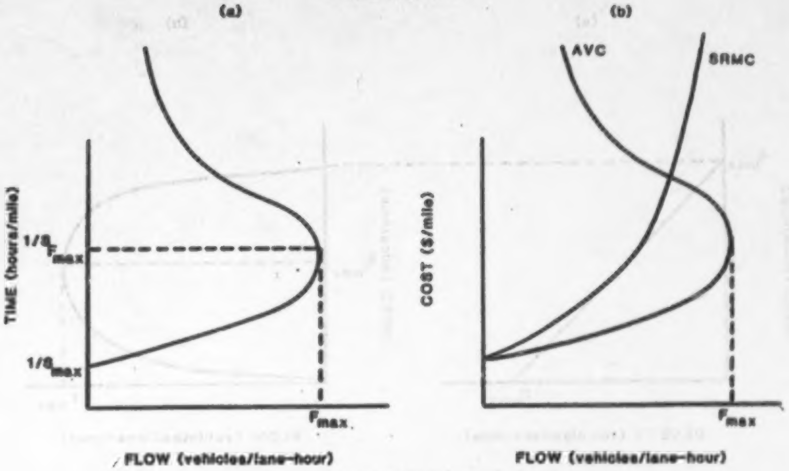

Fig. 2. Derivation of the cost-flow relationship.

timal pricing (and investment) of transportation infrastructure.

The results from a sampling of eight road pricing studies from Great Britain, the U.S., and Canada over a twenty year period are summarized in Table 1.[5] These studies can be grouped into four conceptual categories: short run, equilibrium short run, long run, and equilibrium long run. In the short run, existing roadway capacity is taken as given. The one-dimensional problem is to calculate the net benefit maximizing quantity of use (and the toll that will generate that quantity). In a long-run analysis, optimal road capacity and quantity of use are determined simultaneously. If current capacity is less (greater) than optimal capacity, long-run tolls will be less (greater) than short-run tolls. Non-equilibrium tolls measure the congestion externality at *current* levels of traffic. In Fig. 3 this is represented by the distance between the SRMC and AVC curves at Q_c. If roads are currently underpriced, non-equilibrium tolls exceed equilibrium tolls. In contrast, by incorporating some form of demand relationship, equilibrium tolls take into account the effect that tolls will have on use and thus on congestion.

One of the initial attempts to empirically estimate the magnitude of highway congestion tolls was the study by Walters (1961). He recommended a 10–15 cents per mile toll for peak periods in the more congested areas, in conjunction with a general urban fuel tax of 33 cents per gallon (Johnson (1964), among others, considers an urban fuel tax to be too blunt an instrument to discourage traffic on some routes and encourage it on others at various times.) During 1962, the Ministry of Transport in Great Britain established a committee to study and report on economic aspects of road pricing, as well as on the technical feasibility of implementing road pricing. The Committee's report, commonly known as the Smeed Report after its chairman, argues that the best scheme is a system of direct charging, and that a peak period toll of 9 pence per mile (approximately 10 cents at the then-current exchange rate) in urban areas would generate an increase in net benefits of £100–£150 million per year ($280–$420 million). Also investigated, listed in order of decreasing desirability, were: daily licenses, a parking tax, a differential fuel tax, and a poll tax on employees in congested areas. Ten years later, the Greater London Council (1974) concluded that central area licenses of 60 pence per auto per day ($1.40) would reduce auto traffic entering Central London by 45 percent with net benefits of £32 million per year ($75 million).

Two independent papers by Kraus, Mohring, and Pinfold (1976) and Keeler and Small (1977) each analyze the congestion problem from a long-run perspective. Since optimal highway capacity, and thus congestion, depends on the cost of adding capacity, in a long-run analysis, optimal tolls depend on highway capacity cost. Using what they refer to as a "pseudo-empirical" analysis, Kraus *et al.* estimate long-run peak tolls for a generic U.S. urban expressway, ranging from between 1.2 cents and 2.6 cents per vehicle-mile for a low capital cost expressway on the outer fringes of a large metropolitan area to 6.2–13.1 cents per vehicle-mile for a high capital cost expressway adjacent to a central business district. The welfare gain from a general imposition of such tolls throughout the U.S. ranges from $90 million to $1350 million depending on assumptions. Keeler and Small's (1977) treatment is based on speed-flow relationships and highway construction costs for the San Francisco Bay Area. Peak period tolls range from a low of 2.7 cents per vehicle-mile for a rural-suburban freeway, assuming an interest rate of six percent and a value of travel time of $3.00 per hour, to a high of 34.3 cents per vehicle-mile for a central city expressway, assuming a twelve percent interest rate and a $3.00 per hour value of time.

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[5] The results reported here deal with developed countries only. General analyses of the appropriateness of congestion tolls in less developed countries, as well as empirical estimates of their magnitude, can be found in Bertrand (1978), Churchill (1972), Kirkpatrick (1972), and Walters (1968).

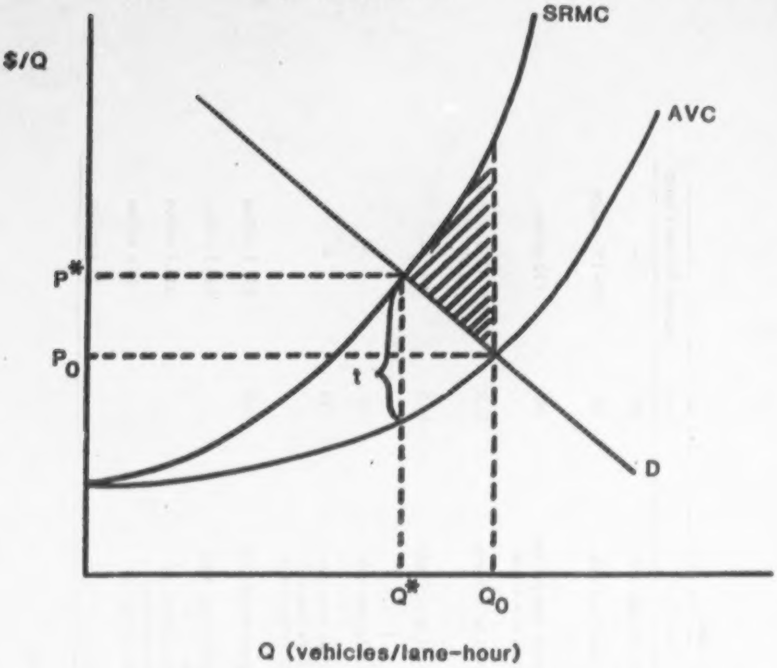

Fig. 3. Optimal congestion toll and welfare loss.

The previously cited works used single equation speed-flow relationships appropriate for the more or less uninterrupted flow conditions on expressways. Dewees (1979) uses a complex simulation model of traffic on city streets in downtown Toronto to capture the effects that intersecting traffic flows in a urban street network have on external congestion cost. His estimates of external congestion cost inbound (AM) at current use levels vary considerably from street to street and range from zero to $1.43 per vehicle-mile with an average of 38 cents per vehicle-mile. The outbound (PM) external congestion cost averages 4 cents per vehicle-mile. Dewees shows that these estimates are quite different from those that would be obtained from the simple single equation models appropriate for uninterrupted flow conditions.

Viton's (1980) work differs from the above short-run studies in two respects. Rather than calculate the congestion externality at current use levels, Viton calculates equilibrium short-run peak period tolls using a binomial logit mode choice model (auto vs. bus). In addition, he calculates tolls for buses and trucks, which are higher than auto tolls because these vehicles are larger and accelerate more slowly (The conventional method of incorporating different vehicle types into a speed-flow relationship is in terms of their "passenger car equivalents." Viton uses a value of 1.6 for buses and 2.2 for trucks.). He applies his model to peak period travel on the San Francisco-Oakland Bay Bridge and calculates auto tolls of 15.4 cents per mile, bus tolls of 24.8 cents per mile, and truck tolls of 33.1 cents per mile. Given that the bridge is approximately nine miles long, tolls for autos, buses, and trucks should be $1.37, $2.23, and $2.98 compared to actual tolls of $0.50 for autos and buses and $1.72 for trucks.

Gómez-Ibáñez and Fauth (1980) also used a binomial logit demand model in their comprehensive study of alternative auto restraint measures in Boston. The policy producing the largest annual net benefit was a downtown parking surcharge of $1.00 during peak periods (NB = $23.8 million). This net benefit was not particularly sensitive to the amount of the surcharge, with a $0.50 surcharge resulting in a $19.0 million net benefit and a $2.00 surcharge yielding $23.2 million in net benefits. A $1.00 per day area license during peak periods for local streets only yielded a much higher net benefit ($20.5 million) than one applied to all streets and expressways ($14.7 million with a $0.50 fee). The two schemes with the lowest net benefits were a surcharge on existing toll facilities (NB = $4.6 million) and a peak period auto-free zone (NB = $1.4 million). At their optimal levels, all schemes, with the exception of the area license on all streets and expressways, would generate additional net benefits if extended into the midday period.

Despite their varied approaches, all of these studies find that optimal charges for peak period use of urban roads are well above those currently charged. Moreover, those studies that calculated the welfare gain from some form of auto restraint measures found that the net benefits

Table 1. Results of selected studies

Study	Application	Peak Toll[a]	Type[b]	Annual Welfare Change[c]
Walters (1961)	generic U.S. urban expressway	10–15¢/auto-mile	SR	—
Ministry of Transport (1964) (Smeed)	urban areas in Great Britian	9 pence/auto-mile	SR	£100–150 million
Greater London Council (1974)	Central London	60 pence/auto per day central area license	SR	£32 million
Kraus, Mohring, and Pinfold (1976)	generic U.S. urban expressway, 1970	1.2–13.1¢/auto-mile	ELR	$90–1350 million for all U.S.
Keeler and Small (1977)	San Framcisco Bay Area expressways, 1972	2.7–34.3¢/auto-mile	ELR	—
Dewees (1979)	city streets in Toronto, 1973	4–38¢/auto-mile	SR	—
Viton (1980)	San Francisco-Oakland Bay Bridge, 1972	15.4¢/auto-mile 24.8¢/bus-mile 33.1¢/truck-mile	ESR	—
Gómez-Ibáñez and Fauth (1980)	Boston, 1975	$1.00/day downtown parking surcharge	ESR	$23.8 million
		$1.00/day area license, local streets only		$20.5 million
		$0.50/day area license, all streets and expressways		$14.7 million
		$0.50/vehicle existing toll surcharge		$4.6 million
		auto-free zone		$1.4 million

[a] The range of tolls given reflects the effects of assumptions.
[b] SR = short run, ESR = equilibrium short run, LR = long run, ELR = equilibrium long run.
[c] —indicates welfare change not calculated.

were large. Borins' (1982, 1984) work provides two exceptions. In each of these papers his approach differs from the papers cited above. Rather than calculate a static welfare loss for a particular year, Borins calculates the present discounted value of net benefits based on a 40-year simulation of an expressway. His annualized welfare losses from non-optimal pricing range from $15,000 for a 10-mile expressway to $1.95 million for an expressway–subway combination. However, it is difficult to compare Borins' results with other studies because of his dynamic approach. In his simulations, the facilities initially are uncongested with small gains to be achieved from marginal cost pricing. Since congestion occurs in the future (in contrast to the other papers where it occurs in the current period), the benefits from the adoption of efficient pricing policies, when discounted to the present, appear small.

As a rough estimate of the impact if congestion tolls were introduced, as appropriate, throughout the United States, Lee (1982) calculates a gain in net benefits of $5.6 billion (1981 dollars). By way of comparison to other transportation policy initiatives, Morrison and Winston (1985) estimate the gains to travelers from airline deregulation in the U.S. to be $5.7 billion (1977 dollars).

Refinements and extensions

Although the basic theoretical approach to congestion pricing has been essentially unchanged since Knight (1924), some extentions to the basic model have been developed more recently by incorporating uncertainty. De Vany and Saving (1980) incorporate uncertainty into their theoretical model of highway pricing and investment in the form of random demand, i.e., at any given price, the number of trips demanded is not fixed, but is a random variable. Within this framework, they more or less duplicate the results from the conventional theory, with one interesting exception. Consistent with conventional theory, optimal prices equal (expected) marginal cost, and the sum of all congestion tolls equals capacity cost (assuming constant returns to scale in highway construction). The exception is that although the certainty theory does not allow traffic jams (i.e., temporary equilibrium on the lower portion of the speed-flow curve), under uncertainty a positive probability of saturation exists, because only *expected* traffic flow is less than capacity.

Kraus (1982) incorporates uncertainty in a different way. In his model, the demand function itself is nonstochastic, but depends on a parameter that is unknown to highway planners who must determine optimal tolls and capacity. Because of the shape of the congestion function, the benefits from additional capacity increase as traffic increases. This asymmetry results in optimal capacity under uncertainty being larger than would be appropriate for the expected value of demand. In Kraus' model, uncertainty increases optimal capacity by three to twelve percent depending on the degree of uncertainty (and on other assumptions). The effect of uncertainty on tolls varies in direction and is usually smaller in magnitude than the effect on capacity. Based on "median" conditions, Kraus' analysis predicts that uncertainty results in a 7.1 percent increase in optimal capacity and a 1.6 percent reduction in the optimal toll. Kraus also estimates that the welfare loss of basing capacity and tolls on their mean-certainty values is approximately $220 million for the U.S. as a whole, an amount he refers to as "modest but significant."

With respect to empirical analyses, areas of refinement include incorporating indivisibilities, and improvements in the specification and estimation of speed-flow curves. Kraus (1981) shows the effect of indivisible highway capacity on optimal tolls. In his analysis, optimal tolls for a generic U.S. expressway, assuming infinitely divisible capacity, would be 8.9 cents per vehicle-mile. Incorporating indivisibilities results in tolls between 5.8 cents and 11.2 cents per vehicle-mile. Kraus concludes that the failure to account for indivisibilities can result in substantial errors in computing optimal tolls.

Boardman and Lave's (1977) work focuses on the estimation of speed-flow curves, which are the foundation for deriving optimal congestion tolls. Whereas previous estimates of such curves used aggregate speed-flow data, Boardman and Lave use each vehicle as the unit of analysis, which avoids the information loss inherent in aggregation. They also find that better fits are possible when the flow variable is based on a six to twenty minute time interval centered around the observed vehicle. In addition, better statistical fits were obtained from estimating the speed-density relationship than from the speed-flow relationship.

Inman's (1978) work is also concerned with estimating the speed-flow relationship. He develops a new approach to the specification and estimation of the speed-flow relationship, called a generalized congestion function (GCF). The GCF contains all of the most commonly used speed-flow relationships as special cases. Assuming the GCF specification is correct, comparing it to the results from a more typical quadratic specification, the quadratic overestimates optimal tolls for low traffic volumes and underestimates tolls for high traffic volumes. Inman estimates that this misspecification would result in a loss of net benefits of approximately one million dollars per year for the Washington, D.C. area.

Distribution

The question of the incidence of congestion tolls was raised as early as 1955 by Vickrey. At first blush, it seems plausible that the introduction of road pricing would be regressive in its incidence. However, the case of road pricing is more complicated than it may initially appear. First, as noted by Kulash (1974), poor workers are less likely to drive to work, as well as being less likely to work in the downtown core most affected by congestion tolls. But even more important, Foster (1974, 1975) points out the difficulty in defining the terms "regressive" and "progressive" when the change in net benefits is positive, since the government could, in principle, redistribute toll revenue so that all groups could gain. (Would it be "regressive" if all income groups gained, but the rich gained more than the poor?) Thus, a full assessment of the distributional impact of congestion tolls cannot be accomplished without an explicit assumption about the government's use of toll revenue.

This is the approach taken in the comprehensive and sophisticated empirical analysis by Small (1983b). Small estimates the net burden of toll, time savings, and revenue uses based on a disaggregate mode choice model. In the absence of any redistribution of toll revenue, low income groups lose more than high income groups, because the higher value of time savings by high income individuals more than compensates for their greater likelihood of using autos. However, under three widely varying assumptions concerning the use of toll revenues, every income class benefits from congestion pricing, except when congestion is initially at a low level. These three distribution schemes are: redistribute proportional to income, equal lump sum distribution, and redistribute to each income class the tolls collected from that class. Only a distinctly pro-rich pattern of redistribution would make any income group consistently worse off. However, it is reasonable to expect a pro-poor pattern of distribution would be used in the U.S. because central cities, with their lower average incomes, would receive the toll revenue. In this case, the toll causes a monetary transfer from rich to poor and a uniform time savings for all income classes. Because these time savings are valued more by the rich, net benefits rise with income. However, although all income *classes* may gain, this is not true for all individuals. In particular, it should not be surprising that low income automobile users are hurt by congestion tolls.

IMPLEMENTATION

The results surveyed in the previous section indicate that adoption of road pricing would generate substantial net benefits. This section addresses the problem of implementation. Specifically, with such large net benefits, why has congestion pricing, with the exception of Singapore, never been implemented on a large scale? These implementation problems can be divided into legal issues and political issues. The legal issues are relevant to the Unites States, whereas the political problems have more general applicability.

Legal issues

As Coit (1974) points out in some detail, federal law in the United States prohibits "tolling" roads built with federal funds. However, user taxes may be allowed. The distinction between a toll and a user tax reletes to the timing of collection. Tolls are collected when the privilege is exercised, whereas user taxes are not. Thus, although toll booths would probably not be allowed on federal roads, some other mechanism of charging that is separate from time of passage, such as a ticket or license system, or an electronic system with monthly bills, probably would be allowed. In addition, there is no prohibition against charging on non-federal roads, which comprise a large share of urban road mileage. In the twenty largest U.S. cities, nonfederal road mileage amounts to between 77 and 95 percent of the total. However, since cities derive their power to tax from their respective state governments, permission from the state legislature would have to be obtained before a city could impose a user fee.

The laws governing charging for the use of bridges are even more complicated. If a bridge was built with federal funds, tolls may not be charged after the state's share of construction costs has been repaid, even for maintenance. Federal law also governs some bridges not built with federal aid, if they cross navigable waters.

Finally, enforcement of road pricing may also encounter legal problems. The method of enforcement of the central area license plan in Singapore is for a monitor to write down the license number of vehicles that cross into the restricted zone without the appropriate permit. A ticket is subsequently sent to the registered owner of the vehicle. However, as Higgins (1979) points out, many state laws require that drivers, not owners, be liable for moving violations. Of course, this problem is not insurmountable but would require other enforcement techniques. Thus, legal problems may make road pricing more difficult, but they do not prevent it.

Political issues

Although legal issues limit the degrees of freedom of road pricing schemes, political realities are primarily responsible for blocking implementation of road pricing. According to Howitt (1980), the conclusion by some observers that political problems arise because neither policy makers nor the public understand the benefits of road pricing is too simple. The political acceptability of such proposals depends on more than a positive net benefit; the distribution and visibility of the impact are also relevant. Howitt believes the nature of auto restraint policies results, in general, in their being "fragile" policy initiatives, particularly vulnerable to political opposition and political inertia.

Howitt divides these difficulties into three categories. First, and most important, is the public reaction to auto restraint proposals. The nature of the benefits and costs is such that it is difficult to rally public support (these proposals are generally not initiated by citizens, but by government agencies) and easy to evoke opposition (for example, from business groups that are already organized for other purposes). Along these lines, Button (1984) stresses the importance of public perceptions, in particular the asymmetry of perceptions of cost and benefits. The imposition of a congestion toll represents a tangible cost, whereas the potential benefits from less congestion and faster trips are more vague. Second, is the difficulty of securing the sequence of legislative and administrative approval necessary to implement these plans, particularly with the decentralized form of government authority over such matters in the U.S. Finally, if approved, the more ambitious schemes, such as central area licenses, face a high degree of difficulty in actual implementation.

These political problems were acute enough to cause abandonment of preliminary *studies*, sponsored by the U.S. Urban Mass Transit Administration during the late 1970s, on the feasibility of auto restraint measures in several cities. Based on studies of the cities involved, Higgins (1979) reports both major and minor objections to proposed auto restraint measures. The major objections are that the measures: 1) interfere with the right to travel; 2) harm business or business image; and 3) discriminate against the poor. Minor objections include the points that the measures: 1) are hard to enforce; 2) overload transit facilities; 3) relocate traffic problems; and 4) require legislative clearance. May (1979) points out that these objections are virtually identical, but with different emphases, to the objections raised to London's Supplementary Licensing Proposals.

The major objections are particularly interesting, considering that what evidence exists suggests that 2) and 3) do not hold. Evidence from Singapore indicates that area licenses per se do not harm downtown business. Furthermore, Small's results suggest that these proposals are most likely not "regressive." Because of public skepticism, as Small points out, political feasibility probably requires that an explicit package of tolls and revenue uses be adopted.

Singapore[6]

No review of implementation issues would be complete without mention of Singapore's experience. During the late 1960s and early 1970s, the government of Singapore carried out two major transport studies, both of which concluded that limitations on the ownership and use of private motor vehicles were necessary. The government's goal was to reduce peak hour traffic by 25 to 30 percent. Several alternative measures, including increased parking charges in the central business district and higher taxes on the import, purchase, and registration of automobiles, were considered and adopted, but were insufficient by themselves, due to their lack of temporal or geographical specificity. Accordingly, during 1975 the Area Licensing Scheme (ALS) was implemented. This scheme, the first and currently the only one of its type in the world, is part of a package of transport measures designed to reduce the growth of car ownership and use, particularly during peak periods, and to improve public transport and the environment. A restricted zone of about 2.4 square miles was established in the central business district. During restricted hours (initially 7:30 AM–9:30 AM, subsequently extended to 10:15 AM), entry into the zone requires purchase and display of a special license. Monthly licenses are sold at the Registry of Motor Vehicles and at some post offices. Daily licenses are also sold at post offices and at road-side sales booths. Initially, the license for private cars cost S$3 per day or S$60 per month. Currently the fee is S$5 per day or S$100 per month. (The exchange rate is approximately S$2.10 = U.S. $1.00.) Company cars pay twice this amount; taxis pay forty percent; buses, goods vehicles, motorcycles, and car pools with at least four persons are exempt.

The effect of the ALS on the amount and mix of traffic entering the restricted zone during restricted hours was dramatic. Total vehicle traffic initially declined by 41.6 percent (74,014 during March 1975 to 43,252 during December 1975), but by May 1983 vehicle traffic had grown to 57,035 for a 22.9 percent decline. The decline in the use of private cars has been even greater, with an initial 71.2 percent decline, which, by May 1983 was down to 63.3 percent. This decline was caused by a substantial shift from auto to bus and car pool. From 1975 (pre-ALS) to 1983 the share of work trips taken into the restricted zone by bus increased from 33 percent to 69 percent, while auto's share declined to 23 percent from 56 percent. Car pools increased from 23 percent of total cars entering the zone prior to ALS to 47 percent during 1982.

Administration and enforcement have not proven to be problems. Approximately 30 entry points around the zone were established with the license number of transgressors written down by police and a ticket sent to the owner. Initially, infringements occured at the rate of 200 per day, but have subsequently stabilized at between 50 and 60 per day. The negative impact on business that many observers anticipated did not materialize. Interviews with businessmen and retail shopkeepers reveal that the ALS had no particular influence on sales, etc. Furthermore, labor availability appears to have improved because of improved public transport.

However, there have been some problems. Afternoon congestion has remained at about its former level, since controls are only in effect during the morning rush hours. As an indication of one of the causes of this asymmetry, it is estimated that only ten percent of morning car poolers share rides home. Another problem is that traffic has been reduced too much because fees are too high (Watson and Holland, 1976; Toh, 1977). Nonetheless, conservatively valuing net travel time savings (ignoring savings in fuel and other vehicle operating costs) Holland and Watson (1978) estimate a first-year rate of return on the investment in the Area Licensing Scheme of fifteen percent, a more than adequate return to justify the investment.

Holland and Watson believe that it should be possible to design and implement a workable scheme for a wide variety of cities. However, they do cite particular factors that made implementation of the ALS easier in Singapore than might be expected elsewhere. In general, these factors are consistent with Howitt's arguments for why implementation in the U.S. context is difficult. First, the relative isolation of the region from outside traffic makes administration and enforcement easier. Secondly, because cars were used by only a relatively small fraction of downtown commuters prior to the ALS, there were fewer potential opponents, as well as a greater relative capacity of public transport to accommodate those who switched from auto to transit. Political problems common to such schemes elsewhere are much less important in Singapore because Singaporeans tend to believe that government acts in the general social interest and are thus more accepting of rules and their costs. Finally, planning and implementation are much easier in a city-state with only one level of government.

Hong Kong[7]

The latest and most ambitious road pricing scheme is the Electronic Road Pricing (ERP) system planned for

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[6] Unless attributed otherwise, the facts in this section come from Behbehani *et al.* (1984).

[7] The information in this section is from Dawson (1983).

Hong Kong. During 1982, although there were less than five vehicles for every one hundred persons in Hong Kong, there were 300 vehicles for every kilomketer of drivable road. As was true in Singapore, general increases in the cost of automobile ownership and operation were not considered sufficient in themselves to attack the congestion problem, due to their lack of selectivity. Electronic road pricing, on the other hand, is the most selective of all auto restraint schemes. The plan for Hong Kong is to fit every vehicle with an Electronic Number Plate (ENP). The ENP is a sealed unit, about the size of a video cassette tape, fitted underneath the vehicle. The unit is "interrogated" by transmitters buried beneath the road surface at each of the 300 planned electronic toll points. The ENP then transmits its unique number to a computerized receiver that stores the information. The vehicle's account is charged for a predictable number of units, depending on the location and time of day, with a bill sent to the vehicle's owner at the end of the month. Vehicles failing to respond with a valid or operative ENP are photographed for subsequent assessments of penalties. The Hong Kong government has given the go-ahead for a 21-month pilot stage, to have begun in April 1985. Based on the results of this test, a fully operational system could be in place by 1987.

FINAL ASSESSMENT

The virtually unanimous result of empirical research on road pricing is that substantial net benefits could be attained if auto restraint measures were adopted in the more congested cities of the world. The Singapore experience (and the plans for Hong Kong) indicate that, in the right institutional setting, such schemes can be made operational. However, what remains in doubt is the political feasibility of such measures in the U.S., Canada, and Great Britian. The evidence that does exist indicates that the public and its elected officials are not particularly keen to adopt the more "visible" measures, like central area licenses.

There are, however, alternative approaches to reduce traffic congestion. One set of procedures that may be beneficial regardless of whether road pricing is used falls under the heading of engineering techniques. These methods, including reversible lanes, traffic signal optimization, use of one-way streets and parking bans, serve to increase existing roadway capacity. There are also substitutes for road pricing that are less direct and that offer lower net benefits, but perhaps have greater public acceptance. For example, metering traffic onto a congested facility at a rate slightly less than the maximum capacity of the facility prevents development of supersaturated conditions (on the lower portion of the speed-flow curve). Although users must wait to enter the facility, the increased flow reduces total trip time.

Another substitute for road pricing is traffic priority for high occupancy vehicles. Small (1983a) finds net benefits from bus priority lanes of 34–91 cents per passenger round trip when initial one-way congestion is between 6 and 15 minutes. This translates into annual net benefits for an expressway with three lanes in each direction of between $1.6 million and $5.0 million. He also finds that, under idealized conditions, these net benefits are about one-half of the net benefits from marginal cost pricing. However, the distribution of net benefits is quite different. A large fraction of net benefits from marginal cost pricing accrues to the government in the form of toll revenue. Those accruing directly to individuals are smaller (perhaps negative) than with bus priority. Small notes that if individuals do not perceive net benefits accruing to the government as benefiting them, it is not surprising that priority schemes have greater public support.

Subsidization of alternatives to automobile transportation provides yet another indirect "solution" to the congestion problem. Glaister and Lewis (1978) take the current mispricing of automobile transportation as given and calculate second-best transit fares for London, which would attract auto users and increase net benefits. They find that, on these grounds, pricing transit below marginal cost is justified.

Given the resistance to road pricing, research and policy initiatives should be directed to alternative policies to reduce congestion, such as increased parking taxes and the other policies above, (as well as to such areas as infrastructure pricing[a]) that have a higher degree of political acceptability. Such policies may have lower net benefits than direct pricing, but lower *realizable* net benefits are superior to higher *unrealizable* ones.

REFERENCES

American Association of State Highway and Transportation Officials (1977) *A Manual on User Benefit Analysis of Highway and Bus Transit Improvements*. Washington, D.C.

Beesley M. E. (1973) *Urban Transport: Studies in Economic Policy*. Butterworths, London.

Behbehani R., Pendakur V. S., and Armstrong-Wright A. T. (1984) Singapore area licensing scheme: A review of the impact. Manuscript, The World Bank.

Bertrand T. J. (1978) Congestion costs in a transport system with an application to Bangkok. *J. Transport Econ. and Policy* **12**, 244–279.

Boardman A. E. and Lave L. B. (1977) Highway congestion and congestion tolls. *J. Urban Econ.* **4**, 340–359.

Borins S. F. (1982) The effects of non-optimal pricing and investment policies for transportation facilities. *Transpn. Res.* **16B**, 17–29.

Borins S. F. (1984) The economic effects of non-optimal pricing and investment policies for substitutable transport facilities. *Can. J. Econ.* **17**, 80–98.

Button K. J. (1984) Road pricing—An outsider's view of American experiences. *Transport Rev.* **4**, 73–98.

Churchill A. (1972) *Road User Charges in Central America*. Johns Hopkins University Press, Baltimore.

Coit R. (1974) Legal issues surrounding roadway pricing on city streets and bridges. *Transp. Res. Rec.* **494**, 1–10.

Dawson J. A. L. (1983) Electronic road pricing in Hong Kong: The pilot stage. *Traffic Engng. and Control* **24**, 372–374.

De Vany A. and Saving T. R. (1980) Competition and highway pricing for stochastic traffic. *J. Business* **53**, 45–60.

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[a] Along these lines is marginal cost pricing of heavy vehicles, consistent with each vehicle's incremental contribution to repaving cost. Small and Winston (1985) estimate that the gains in net benefits from such a policy if it was adopted throughout the U.S. would be $1.22 billion.

Dewees D. N. (1979) Estimating the time costs of highway congestion. *Econometrica* 47, 1499–1512.

Dupuit J. (1849) On tolls and transport charges. reprinted in *Intl. Econ. Papers* 1962(11), 7–31.

Ellet C. (1840) A popular exposition of the incorrectness of the tariffs on tolls in use on the public improvements of the United States. *J. Franklin Inst.* 29, 225–232.

Fitch L. and Associates. (1964) *Urban Transportation and Public Policy*. Chandler, San Francisco.

Foster C. D. (1974) The regressiveness of road pricing. *Intl. J. Transport Econ.* 1, 133–141.

Foster C. D. (1975) A note on the distributional effects of road pricing: A comment. *J. Transport Econ. and Policy* 9, 186–188.

Glaister S. and Lewis D. L. (1978) An integrated fares policy for transport in Greater London. *J. Public Econ.* 9, 341–355.

Gómez-Ibáñez J. A. and Fauth G. R. (1980) Downtown auto restraint policies: The costs and benefits for Boston. *J. Transport Econ. and Policy* 14, 133–153.

Greater London Council (1974) *Supplementary Licensing*. Greater London Council, London.

Haight F. A. (1963) *Mathematical Theories of Traffic Flow*. Academic Press, New York.

Higgins T. (1979) Road pricing—Should and might it happen? *Transportation* 8, 99–113.

Highway Research Board (1966) *Highway Capacity Manual*. National Academy of Sciences, Washington, D.C.

Holland E. P. and Watson P. L. (1978) Traffic restraint in Singapore. *Traffic Engng. and Control* 19, 14–22.

Howitt A. M. (1980) Downtown auto restraint policies: Adopting and implementing urban transportation innovations. *J. Transport Econ. and Policy* 14, 155–167.

Institute of Transportation Engineers (1982) *Transportation and Traffic Engineering Handbook*, 2nd ed. Prentice Hall, Englewood Cliffs, NJ.

Inman R. P. (1978) A generalized congestion function for highway-travel. *J. Urban Econ.* 5, 21–34.

Johnson M. B. (1964) On the economics of road congestion. *Econometrica* 32, 137–150.

Jordan W. J. (1983a) Heterogeneous users and the peak-load pricing model. *Q. J. Econ.* 93, 127–138.

Jordan W. J. (1983b) The theory of optimal highway pricing and investment. *Southern Econ. J.* 50, 560–564.

Keeler T. E. and Small K. A. (1977) Optimal peak-load pricing, investment, and service levels on urban expressways. *J. Pol. Econ.* 85, 1–25.

Kirkpatrick C. H. (1972) The relevance of road-pricing in developing countries: Some results for Tanzania. *Manchester School of Economics and Social Studies* 40, 357–374.

Knight F. H. (1924) Some fallacies in the interpretation of social cost. *Q. J. Econ.* 38, 582–606.

Kraus M. (1981) Indivisibilities, economies of scale, and optimal subsidy policy for freeways. *Land Economics* 57, 115–121.

Kraus M. (1982) Highway pricing and capacity choice under uncertain demand. *J. Urban Econ.* 12, 122–128.

Kraus M., Mohring H., and Pinfold T. (1976) The welfare costs of nonoptimum pricing and investment policies for freeway transportation. *Amer., Econ. Rev.* 66, 532–547.

Kulash D. J. (1974) *Income Distributional Consequences of Roadway Pricing*. Paper Number 1212-12. Urban Institute, Washington, D.C.

Lee D. B. (1982) Net benefits from efficient highway user charges. *Transpn. Res. Record* 858, 14–20.

May A. D. (1979) Comment: Road pricing: Should and might it happen? *Transportation* 8, 119–123.

Meyer J. R. and Gómez-Ibáñez J. A. (1981) *Autos, Transit, and Cities*. Harvard University Press, Cambridge, MA.

Ministry of Transport (1964) *Road Pricing: The Economic and Technical Possibilities*. HMSO, London.

Mohring H. (1970) The peak load problem with increasing returns and price constraints. *Amer., Econ. Rev.* 60, 693–705.

Mohring H. and Harwitz M. I. (1962) *Highway Benefits: An Analytical Framework*. Northwestern University Press, Evanston, IL.

Morrison S. A. (1985) The theory of optimal highway pricing and investment: A comment. Unpublished manuscript.

Morrison S. A. and Winston C. (1985) Intercity transportation route structures under deregulation: Some assessments motivated by the airline experience. *Amer. Econ. Rev.* 75, 57–61.

Pigou A. C. (1918) *The Economics of Welfare*. MacMillan, London.

Small K. A. (1983a) Bus priority and congestion pricing on urban expressways. *Res. in Transpn. Econ.* 1, 27–74.

Small K. A. (1983b) The incidence of congestion tolls on urban highways. *J. Urban Econ.* 13, 90–111.

Small K. A. and Winston C. (1985) Welfare effects of marginal cost taxation of motor freight transportation: A study of infrastructure pricing, in *NBER Conference on State and Local Public Finance* (Edited by H. Rosen). Chicago: University of Chicago Press, Chicago.

Strotz R. H. (1964) Urban transportation parables, in *Public Economy of Urban Communities* (Edited by J. Margolis). Johns Hopkins University Press, Baltimore.

Thomson J. M. (1977) *Great Cities and Their Traffic*. Victor Gollancz, London.

Toh R. (1977) Road congestion pricing: The Singapore experience. *Malayan Econ. Rev.* 22, 52–61.

Vickrey W. (1955) Some implications of marginal cost pricing for public utilities. *Amer. Econ. Rev.* 45, 605–620.

Vickrey W. (1985) The fallacy of using long-run cost for peak load pricing. *Q. J. Econ.* 100, 1331–1334.

Viton P. A. (1980) Equilibrium short-run-marginal-cost pricing of a transport facility: The case of the San Francisco Bay Bridge. *J. Transport Econ. and Policy* 14, 185–203.

Walters A. A. (1961) The theory and measurement of private and social cost of highway congestion. *Econometrica* 29, 676–699.

Walters A. A. (1968) *The Economics of Road User Charges*. Johns Hopkins University Press, Baltimore.

Watson P. L. and Holland E. P. (1976) Congestion pricing: The example of Singapore. *Finance and Development* 13, 20–23.

Wheaton W. C. (1978) Price-induced distortions in urban highway investment. *Bell J. Econ.* 9, 622–632.

Winston C. (1985) Conceptual developments in the economics of transportation: An interpretive survey. *J. Econ. Lit.* 23, 54–87.

APPENDIX

The conditions for optimal pricing and investment of a congested facility such as a highway were first developed by Mohring and Harwitz (1962). The model was extended to include peak-load pricing by Vickrey (in Fitch, 1964), Strotz (1964); and Mohring (1970). This presentation parallels that of Keeler and Small (1977) and assumes that there are n user classes that are identical in their facility requirements, but differ in the value they place on delay time.

Two papers by Jordan (1983a, 1983b) attempt to extend the homogeneous users model to the case where users have different facility requirements, e.g., autos and trucks, which differ in the required lane width and pavement thickness. His results indicate that, in addition to congestion tolls, capacity charges are appropriate for users that make demands on a dimension of capacity. However, this result has been shown to be incorrect by Vickrey (1985) who argues that capacity charges are not appropriate. Morrison (1985) shows that the conventional homogeneous users model needs only slight modification to deal with heterogeneous users. The modification does not alter the conventional model's pricing and investment rules.

Let $P_{it}(Q_{it})$ represent the inverse demand by user class i for use of the facility during period, t, $t = 1, \ldots, T$. $D_t = D(Q_{1t}, \ldots, Q_{nt}, k)$ is the (average) delay experienced by each user during period t, where k is the physical capacity of the facility, for example, the number of lanes. Each user class places a value on delay time during period t of V_{it}. $\rho(k)$ is the annualized cost of capacity. The optimal capacity and quantity of use during each period are determined by maximizing net benefits, *NB*,

$$\max_{Q_{it},k} NB = \sum_{t=1}^{T}\sum_{i=1}^{n} \times \left[\int_0^{Q_{it}} P_{it}(Q'_{it})dQ'_{it} - Q_{it}V_iD_t(Q_{1t},\ldots,Q_{nt},k)\right] - \rho(k). \quad (1)$$

Differentiating (1) with respect to each of the Q_{it} and k and setting each derivative equal to zero yields the first-order conditions.

$$P_{it} = V_iD_t(Q_{1t},\ldots,Q_{nt},k) + \sum_{j=1}^{n} Q_{jt}V_j\frac{\partial D_t}{\partial Q_{it}}$$

$$i = 1,\ldots,n;\ t = 1,\ldots,T, \quad (2)$$

$$\rho'(k) = -\sum_{t=1}^{T}\sum_{i=1}^{n} V_iQ_{it}\frac{\partial D_t}{\partial k}. \quad (3)$$

Equation (2) is the pricing rule, which indicates that price, i.e., user cost, during each period should be set equal to short-run marginal cost. Since each user necessarily bears the average delay cost, V_iD_t, the optimal toll is given by the second term on the right side of eqn (2), which equals the congestion externality, the cost that the last user imposes on others. The optimal investment rule given in eqn (3) indicates that capacity should be expanded until the extra cost of capacity equals the attendant savings in congestion costs by all users during all time periods. Wheaton (1978) shows that investment rule (3) is inappropriate if pricing rule (2) is not followed. If price is less (greater) than marginal cost, application of (3) results in over (under) investment. It can be shown (see Keeler and Small, 1977) that if pricing and investment are optimal, the relationship between toll revenue and capacity costs depends on the technology of capacity construction. If the average delay function, *D*, is homogeneous of degree zero in the *Qs* and *k* (i.e., congestion is a function of the volume-capacity ratio) and constant returns to scale technology applies, revenue will equal cost. If increasing (decreasing) returns exist, revenue will be less (greater) than cost.

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Efficient Transportation Infrastructure Policy

Clifford Winston

Spending public funds to revitalize America's worn and congested roads and runways ranks high on nearly everyone's list of ways for government to raise the nation's productivity. The Governors' Task Force calls for outlays of $1 trillion to $3 trillion over the next 20 years—well above current capital spending—to build more roads and airports. The Joint Economic Committee received a letter signed by more than 300 economists and heard testimony from Alan Blinder and James Tobin, among others, urging an immediate increase in public investment in physical infrastructure.

However, the consensus that public investment must be increased breaks down when it comes to how to raise the money. Some argue the federal government should raise taxes or user fees; Transportation Secretary Samuel Skinner has called on the nation's governors to raise state gasoline taxes. But gasoline tax increases are hard to get through state legislatures, and the federal government is reluctant to spend money on infrastructure because of the deficit.

This paper offers a different perspective on paying for and investing in the transportation infrastructure. The following example illustrates the need to move away from the current national mind set. Pick any pothole-laden, congested two-lane road in an urban area. Suppose public funds are used to widen the road to four lanes and to repave it. Benefits will immediately flow from this investment in the form of lower travel time and less vehicle damage. But many travelers who previously avoided the road during peak travel periods will now find the road attractive and want to use it. The improvements will also induce

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long-lived land-use and vehicle purchase decisions. Before long the road may again fill to capacity and steadily deteriorate. Generalizing from this example, the trillion dollars spent over the next 20 years might result in expanded transportation capacity that eventually faces the same problems as before. This is an illustration of Downs's (1962) law: On urban commuter expressways, peak-hour traffic congestion rises to meet maximum capacity, because commuters shift from less preferred modes and times of day.

This cycle can be broken only if infrastructure is priced and invested in more efficiently. If the pothole-laden road is kept to two lanes when it is repaved but vehicles are required to pay efficient tolls based on congestion and pavement wear, then the road's capacity is far less likely to be exceeded during peak periods and its pavement will remain in good condition. Making efficient use of current transportation capacity will reduce the need for massive public investment in airports and roads and will prevent the recurrence of infrastructure problems.

Surprisingly, the belief of most economists that public infrastructure spending should be substantially increased is not based on efficient pricing and investment principles. Instead, it appears to be based on either personal observations or on a suspicion that because uncongested infrastructure is a public good, society has tended to invest too little in it. Both perspectives have diverted many economists and policymakers from realizing there are surprisingly large but plausible benefits from *efficient* infrastructure pricing and investment.

These benefits arise because airports and roads are characterized by pricing systems that do not reflect economic costs and by poor design decisions that have resulted in higher costs of use. If road and airport systems are priced and invested in efficiently, then the long-run requisite increases in investment are quite modest, the systems would be roughly self-financing in places where some congestion is optimal, and the federal budget deficit is reduced. Efficient infrastructure policy can also complement the beneficial effects that deregulation of the transportation industries has had on competition and firms' operations, and help to address the primary sources of current discontent with deregulation.

The Theory of Efficient Infrastructure Policy

Transportation infrastructure provides *capacity*, in the form of traffic lanes and runways, for highway and air trips, as well as *durability*, in the form of thick pavement, to facilitate trips in heavy motor vehicles and large aircraft. Users of the infrastructure impose costs on themselves and others by contributing to congestion, which increases travel time, and by wearing out the infrastructure, which necessitates maintenance expenditures to repair pavement and vehicles.

Efficient infrastructure policy maximizes the difference between social benefits and the costs of use, including the costs that users impose on others, by specifying pricing guidelines to regulate demand and investment guidelines to specify design. (Winston (1985) presents a mathematical derivation of these guidelines.)

Although the literature on optimal pricing and investment has a long and distinguished history that dates back to the writings of Pigou and Knight among others (see Winston (1985) for a survey), Mohring and Harwitz (1962) were the first to determine optimal pricing and investment policies in a rigorous long-run framework. Although recent work has extended their model to account for demand uncertainty, lumpy investment and so on, their basic insights remain intact. The efficient marginal cost pricing rule recognizes that when infrastructure users make travel decisions, they will ignore their contributions to congestion and infrastructure wear. As a result, the social costs of a trip will exceed private costs, and the infrastructure authority must therefore set congestion tolls and infrastructure wear charges to close this gap. The efficient investment rule calls for capacity and durability to be produced to the point where the marginal benefit from increasing investment in each dimension equals its marginal cost. The pricing and investment rules jointly constitute an efficient long-run policy, in which a user's full marginal cost is determined at the optimal level of capacity and durability.

Mohring and Harwitz also showed that the financial viability of a public infrastructure facility under optimal pricing and investment depends upon its cost function. If capacity and durability costs are jointly characterized by constant returns to scale, then the facility's revenue from marginal cost pricing will fully cover its capital and operating costs. If costs are characterized by increasing returns to scale, then marginal cost pricing will not cover costs; conversely, if costs are characterized by decreasing returns to scale, marginal cost pricing will provide excess revenue. The analysis that follows discusses the effects of implementing optimal pricing and investment guidelines.

Efficient Highway Pricing and Investment

The United States has nearly four million miles of roads, but roughly half of the nonlocal roads are currently in fair or poor condition, and traffic during commuter rush-hours approaches capacity on one-half of the urban interstates and one-third of the other main arterial highways (Small, Winston, and Evans, 1989). Efficient highway pricing and investment could dramatically improve the condition and performance of our roads, while requiring only a small increase in capital spending.

Historically, gasoline taxes have been used to charge vehicles for their use of the roads and to finance expenditures. The gasoline tax was a reasonable way to raise revenue as long as roads were uncongested and in good condition. But fuel tax receipts fluctuate with economic conditions and fuel prices, and recent shortfalls in gas tax revenues have made it increasingly necessary to supplement the gas tax with state and local revenues.[1] These periodic shortfalls and continual uncertainty are one reason to move away from the fuel tax as a source of highway revenue. A more important reason is that the fuel tax does not reflect the pavement damage and congestion caused by vehicles.

Pavement Wear Charges

Pavements become worn as vehicles pass over them and eventually require resurfacing. Pavement damage itself depends on *vehicle weight per axle*, not total vehicle weight. The damage caused by an axle is defined in terms of the number of "equivalent standard axle loads" (esals) causing the same damage: the standard is a single axle of 18,000 pounds. Small and Winston (1988) report that this damaging power rises exponentially to the third power with its load. (This differs from the conventional belief that the damaging power rises exponentially to the fourth power.) Thus, for example, the rear axle of a typical 13-ton van causes over 1000 times as much damage as that of a car. Since trucks and buses cause almost all of the pavement damage, discussion of pavement wear charges is usually limited to them.

A marginal cost pavement wear charge can be assessed by multiplying a vehicle's esal-miles by the marginal cost of an esal-mile. For example, Small, Winston, and Evans (1989, p. 42) estimated the (average) marginal cost of an esal-mile on rural interstate highways to be 1.5 cents.[2] Thus, a truck equivalent to 2 standard axles traveling 100 miles on a rural interstate would accrue 200 esal-miles and a charge of $3.[3] Such a pavement wear charge would reflect much more accurately the damage caused by vehicles using the road. It would also give truckers an incentive to reduce axle weights by shifting to trucks with more axles, thus extending pavement life and reducing highway maintenance expenditures.

The fuel tax currently in use provides truckers with the opposite incentive: the tax rises with a vehicle's axles, since trucks with more axles require larger engines and get lower fuel economy. Another counterproductive incentive is that many state turnpikes charge more for a given weight if it is carried on a vehicle with many axles.

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[1] Tolls are levied on some roads and eight states have adopted taxes that assess trucks according to their total weight and distance traveled, but such charges account for only a small share of highway revenues.

[2] The National Cooperative Highway Research Program calculated the average maintenance cost per esal-mile to be 1.6 cents (Transportation Research Board, 1986).

[3] New devices for weighing trucks in motion and improvements in microelectronic identification make it possible for firms and auditors to tabulate esal-miles accurately.

Optimal Pavement Durability

The damage that a truck does to a pavement depends not only on its axle weight but also on the durability (thickness) of the pavement.[4] Pavement thickness has been strongly influenced by guidelines from the American Association of State Highway and Transportation Officials (AASHTO). Small and Winston (1988) examined these recommendations, and found that AASHTO had failed to incorporate economic optimization into the design procedure (failing to minimize the sum of capital and maintenance costs) and had developed a relationship between pavement life and pavement thickness that was statistically flawed. As a result, they found that optimal thicknesses were significantly higher than current thicknesses, especially for heavily traveled interstates. For example, the optimal thickness for heavily traveled rigid concrete pavements is 13.8 inches compared with AASHO's estimate of 11.2 inches. Increasing thickness by 2.6 inches more than doubles the life of the pavement. Greater road thicknesses would substantially reduce annual maintenance expenditures and, because they would lower the marginal cost of an esal-mile, would also soften the impact of efficient pavement wear taxes on truckers.

The economic effects of building roads to optimal durability and of charging marginal cost pavement wear taxes to truckers are shown in Table 1. The effects of the first-best policy are shown in the first column of the table, while columns two and three show the results of partial implementation. Gains in net welfare from the first-best policy total $7.75 billion annually (in 1982 dollars), nearly 18 percent of total 1982 highway expenditures. The source of these benefits is a huge, roughly 75 percent, annual reduction in maintenance costs of nearly $10 billion, which is achieved with only a $1.2 billion annualized increase in capital costs. This policy is also politically attractive because it entails little redistribution; in fact, all major highway interests gain. Truckers and their customers gain because increased durability *lowers* the efficient road-wear charges from the charges that apply on today's roads. The public sector gains because trucking firms distribute their loads over more axles (change vehicle types) reducing standard loadings (esals) by 38 percent, reducing highway maintenance expenditures. Railroads gain slightly from an increase in traffic,[5] and the federal government's budget balance is improved because the reductions in maintenance expenses greatly offset the loss in highway revenues and increase in capital expenses.

The table also shows the importance of combining optimal pricing and investment. Setting efficient pavement wear taxes at current highway durability (middle column) would produce a smaller welfare gain and generate substantial

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[4] Besides making pavement thicker, durability can also be improved by improving drainage, using better construction materials and other methods. Aging and weathering leave a pavement more vulnerable to heavy loads.

[5] Railroads gain because truck charges tend to rise on intercity traffic shipped long distances in large quantities: hence their business grows despite a small overall decrease in truck charges.

Table 1

Annual Economic Effects of Efficient Infrastructure Policy for Roads

(change, relative to current practice, in billions of 1982 dollars except as noted, positive dollar values indicate improvement)

Item	*Efficient Pricing and Investment*	*Efficient Pricing with Current Investment*	*Efficient Investment With Current Pricing*
Investment Costs			
Maintenance Savings	9.428	6.441	8.536
Annualized Capital Savings	−1.276	—	−2.236
Total Savings	8.152	6.441	6.300
Trucking Firms' and Shippers Welfare[a]	0.134	−5.586	—
Government Revenues	−0.574	3.884	—
Modal Shifting[b]			
Modal surplus	0.029	0.204	—
Rail Profits	0.011	0.411	—
Total Welfare	7.752	5.354	6.300
Change in Standard Loadings[c] (percent)	−38.12	−48.38	0.0

Source: Small, Winston, Evans (1989).

[a] These estimates do not include changes in user costs (vehicle damage and slower speeds due to damaged pavement). Small, Winston, and Evans (1989) point out there are difficulties in obtaining reliable estimates of this effect. Their rough estimates indicate that under optimal pricing and investment user costs are reduced by $3.03 billion when they are optimized along with maintenance and capital costs. User costs still fall by $1.8 billion under optimal pricing and investment when they are not explicitly optimized.

[b] Modal surplus measures the benefits to shippers who shift freight to or from railroads in response to the change in truck taxes.

[c] The reduction in standard loadings is accomplished with only a small change in ton-miles that results from modal shifting, most of the reduction is from truck-type shifts.

redistribution from the trucking industry to the public treasury. This finding confirms that truckers are currently being undercharged for their use of the roads, but it also reveals how inadequate infrastructure investment can penalize an industry.

Building roads to optimal durability while maintaining current pricing (last column) also produces a smaller welfare gain and requires greater capital outlays. Because optimal investment is a long-run policy and the benefits from reduced maintenance expenses will be seen only several years after initial capital outlays, the present value of which must all be incurred when a road is upgraded, extra capital expenses could arouse short-term budgetary concerns. Nonetheless, society would save $4 for every $1 spent, including interest, which is a healthy return.

Congestion Charges

Regardless of what policies are implemented to fight traffic congestions —from high-occupancy vehicle lanes to subsidies for public transit—delays get longer and drivers and passengers get angrier. At first sight, increasing highway capacity may appear as sensible as increasing highway durability, but capacity and durability inadequacies have different effects on road users. Few vehicles are discouraged from using a road because of its durability problems, so optimal durability produces benefits without significantly increasing use. On the other hand, because many motorists are discouraged from using a congested road, traffic will be attracted when capacity is expanded to relieve congestion. Benefits may be accrued by expanding capacity but congestion will persist in the long run (Downs's law). The only way to reduce congestion permanently is to set an explicit price for capacity.[6]

Congestion pricing has been advocated by economists for many years, but policymakers have either ignored it or dismissed it on political and practical grounds. For example, congestion pricing is not mentioned in *Time's* (1988) eight-page cover story on gridlock. Ross Sandler, New York City Commissioner of Transportation (Pitt, 1989), dismissed the idea by saying, "What would you do—put tolls on all the highways?"

However, Small (1983) shows that objections by those who protest that lower income drivers would be unfairly penalized are unfounded. If toll revenues are used to lower property taxes, invest in public transit, or replace registration fees or fuel taxes, congestion pricing can benefit all income classes. Objections that tolls are impractical are also overstated. Congestion tolls varying by time of day, and imposed when congestion would otherwise persist, can be implemented without disrupting a traveler's journey. An automated vehicle identification (AVI) system, in which an electronic number plate is mounted underneath each vehicle, can be used to transmit a vehicle's numbered identification to a control center each time it passes over a power loop embedded beneath a toll site. The vehicle owner is then sent a monthly bill similar to a phone bill. Such a system has been tested in Hong Kong and found to perform exceptionally well. A sample of conclusions from the test includes the following: more than 99.7 percent of vehicles crossing a given toll site were correctly identified; security features could detect attempted fraud; and manual supplementary police enforcement at toll sites was proven feasible (Catling and Harbord, 1985). In the United States an AVI system is currently operating on the North Dallas Tollway and in New Orleans.

Because the effects of congestion pricing vary widely by locale, owing to different traffic densities and road systems, most studies of its effects have been site-specific. But a study by Lee (1982) made a rough estimate of the effect of adopting congestion pricing nationwide and found that it would generate $5.65 billion (1981 dollars) in annual net benefits, mostly in the form of annual travel delay savings of approximately one billion vehicle-hours. If congestion pricing were accompanied by optimal investments in road capacity, then annual net benefits would be even higher and the initial redistribution from road users to the road authorities would probably be less.

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[6] Some have argued that the fuel tax is a surrogate for congestion pricing because cars tend to get lower fuel economy in heavy traffic. But fuel economy could actually improve if, for example, congestion forces cars to travel at moderate speeds (30 miles-per-hour) instead of higher speeds.

Highway Finance and Additional Benefits

Although efficient road pricing and investment would generate substantial benefits, one must estimate the degree of scale economies in highway production to determine whether this policy would enable highways to be financially self-sufficient. Highways produce two "products:" traffic volume requiring capacity (number of lanes) and standard loadings requiring durability (thickness). Determining the economies of scale in this multiproduct case requires finding the economies for each specific product, and then the economies of joint production, commonly referred to as economies of scope. Small, Winston, and Evans (1989) find strong economies associated with producing standard loadings, because a pavement's ability to withstand traffic increases far more than proportionally with its thickness. They find evidence from the literature that there are mild economies from producing traffic volume. (A common explanation is that capacity goes up faster than the number of lanes; for example, two lanes in a given direction have more than twice the capacity of one lane.) However, they also find diseconomies of scope from jointly producing volume and standard loadings, because as the road is made wider to accommodate more traffic, the cost of any additional thickness required to handle heavy vehicles rises, since all lanes must normally be built to the same thickness. The result of combining these components is that the product specific economies are virtually offset by the diseconomies of scope, which leads to approximately constant returns to scale in highway production.[7]

These constant returns to scale imply that urban roads that are sometimes congested could be self-financing in the long run. For uncongested rural roads, additional charges such as license and registration fees would be required to attain a balanced highway budget.

This finding reveals an important additional benefit from congestion pricing. If efficient marginal cost pricing for road wear is undertaken alone, the road authority would face a deficit for urban roads, as well as rural roads, because of the economies of pavement durability.[8] But when efficient road wear pricing is combined with efficient congestion pricing, the (marginal) cost of building the pavement itself is effectively charged twice: once from trucks because they require a thicker pavement and once from cars because they require a wider pavement. The result is that losses from pavement durability economies are eliminated.

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[7] Small, Winston and Evans (1989) discuss the possible efficiency gain from a road system that separates truck and auto traffic, which is motivated by their finding of diseconomies of scope. Such a system could be like the split of autos and trucks on the New Jersey Turnpike outside of New York City.

[8] Small, Winston and Evans (1989) find that the "pavement deficit" is reduced by optimal pavement wear pricing and investment from its current level of $16.16 billion (1982 dollars) to $9.84 billion

As a further benefit, congestion pricing could substantially reduce the public transit operating deficit, which approached $9 billion in 1985 according to the Urban Mass Transportation Administration. Higher congestion tolls will cause some motorists to shift to public transit. For example, Viton (1983) finds that congestion pricing in the San Francisco Bay Area would raise mass transit's share of downtown commuters by 10-20 percentage points. This increased ridership will probably lead to buses or trains running more frequently, which will increase convenience and allow transit agencies to raise fares above inefficiently low levels but still attain more ridership.

Efficient highway infrastructure policy could also complement the effects of trucking deregulation. Instituted in 1980, motor carrier deregulation has benefited shippers by some $14 billion annually (1988 dollars) in lower shipping costs and better service (Winston, Corsi, Grimm, and Evans, 1990). Because of shippers' increased use of just-in-time inventory methods, which attempt to keep inventories to a minimum by bringing in raw materials just in time for production, frequent and reliable service has become especially important. Deregulation has also stimulated the trucking industry to make innovations in equipment, routing, scheduling, and communications.

Congested and damaged roads thwart the effectiveness of carrier innovations, cause travel delays that disrupt the just-in-time inventory process, and raise carrier operating costs through wasted fuel and vehicle damage. All these costs are eventually borne by consumers. Some recent proposals to combat congestion and pollution would ban trucks from downtown areas during certain parts of the day and raise shipping costs even higher. Efficient highway infrastructure policy could supplant potentially counterproductive proposals, and facilitate carriers' continuing efforts to minimize shipping costs.[9]

Efficient highway infrastructure policy is designed to make the best use of scarce durability and capacity. Scarce durability arises because roads can only withstand a finite number of standard loadings before they need resurfacing.

(1982 dollars). The pavement deficit is defined for the optimal and current policy as the difference between tax revenues and the annualized value of resurfacing expenditures and the cost of the paving material itself.

[9] Although they are not analogous to the problems with publicly owned roads, infrastructure problems could also arise in railroad freight service because rail infrastructure is privately owned and maintained. Winston, Corsi, Grimm, and Evans (1990) point out that rail's financial performance has improved because of deregulation and that no major changes in rail policy are currently warranted. But they also suggest that a radical policy initiative, separating ownership of the rail infrastructure from ownership of the operating companies, could be necessary in the event of an economic downturn to preserve rail's financial viability and to facilitate sufficient railroad competition.

Efficient road wear pricing attempts to reduce loadings by forcing shifts to trucks with fewer loadings; efficient investment recommends road design that allows roads efficiently to withstand a greater number of loadings. Each policy extends road life and saves society maintenance expenses; together they reduce maintenance expenses even more and, most importantly, they minimize redistribution and thus political problems. Scarce capacity is effectively rationed by congestion pricing; such capacity only can be used by those motorists willing to pay an efficient premium for it. With efficient highway infrastructure policy in place, authorities are able to make efficient decisions about whether building new roads can be economically justified.

Efficient Airport Pricing and Investment

Airport congestion and flight delays are receiving increasing public attention. The Department of Transportation has tried to coax airlines into improving their reliability by publicizing each carrier's on-time performance. Many observers argue the problem stems from a lack of airport capacity, citing the fact that no new major airports have been built since 1974. There are many supporters of federal subsidies for a new Denver airport, estimated to cost $2.5 billion.

Although additional airport capacity is not likely to attract as much traffic as additional highway capacity, the tremendous increase in aircraft departures of more than 25 percent during the past decade, partly spurred by deregulation, and the high cost and long lead times associated with new airports suggest that society will be faced with a difficult and expensive catch-up task if it commits itself to reducing air congestion by building more airports. A less costly and more effective solution is to price and invest in existing airports more efficiently.

Efficient Runway Pricing and Capacity

The most common way of assessing landing fees at airports is by aircraft weight. Thus, a commercial jumbo jet pays considerably more to land during a given hour than a small private plane (general aviation). Weight-based landing fees were probably a reasonable way to allocate airport costs and raise revenue when airports were uncongested, but today, the principal cost that an aircraft imposes when it takes off or lands is that it delays other aircraft. (Runway damage caused by aircraft is small.) Morrison and Winston (1989b) found that this delay can be substantial. For example, the elasticity of average departure delay, defined as the percentage change in average departure delay caused by a 1 percent change in aircraft departures, is 2.9 for commercial carriers. This is similar to general aviation's elasticity of 2.5. Current weight-based landing fees undercharge aircraft in inverse proportion to their weight because they do not account for the congestion externality.

An airport's capacity is primarily determined by its number of runways, although terminal facilities and gate space can also have some effect. If an airport already owns the land, an additional 10,000 foot × 150 foot runway can be constructed for roughly $40 million in 1987 dollars (Morrison and Winston, 1989b). Optimal runway capacity is reached when the marginal cost of an additional runway is equated with the marginal benefit of reduced delay. The benefits of reduced delay are mainly the time saved by air travellers. Morrison and Winston (1989b) estimate average delay to be just a few minutes at some airports but as high as 27 minutes at New York (La Guardia) airport. They also estimate commercial air travelers' hourly value of time to be $42 (1988 dollars) and account for the number of passengers carried by different types of aircraft. Thus, for example, the passenger delay cost imposed on a commercial jet landing at La Guardia approaches $2,000. The effects of replacing weight-based landing fees with marginal cost congestion fees and of building the optimal number of runways at airports is shown in Table 2.[10] The effects of efficient runway pricing and investment are shown in the first column of the table. and the effects of adopting efficient runway pricing at current runway investment are shown in the second column.

Optimal airport pricing and investment policy could generate roughly $11 billion (1988 dollars) in annual benefits. Travelers reap $8 billion in reduced delay and also would pay lower fares because the expansion in runway capacity called for under optimal investment combined with congestion pricing would reduce congestion to such an extent that. on average, landing fees would fall.[11] The annualized cost of the additional runway investment is only about $1.5 billion. Carriers benefit from the lower operating costs from reduced delay. Airports' net revenues would fall slightly, but, as we argue below, they would become financially self-sufficient.

The combination of efficient pricing and efficient investment policies is again economically and politically important. If airports adopted efficient congestion fees alone, there would be considerable redistribution from travelers —who would primarily absorb the higher takeoff and landing fees through higher fares—to airports. The losses to commercial travelers could be softened by reductions in the 8 percent ticket tax used to support air traffic control and airport construction. But general aviation, which would face the largest user fee

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[10] Optimal runway capacity is determined under the assumption that no additional land is needed for runway expansion. Although this assumption is unreasonable for some airports, other capacity-enhancing mechanisms are or will be available that could by themselves produce a similar effect or enable runways to be built closer together at airports with limited room for growth. These mechanisms include high-speed runway exits, microwave landing systems, phased array radar, and digital pilot-air traffic control communications. In any case, this assumption produces an upward bias in the estimate of net benefits.

[11] General aviation travelers will face higher landing fees. But the Morrison-Winston model does not account for the greater flexibility that general aviation travelers have in their choice of airport and arrival and departure time, thus their loss is overstated.

Table 2

Annual Economic Effects of Efficient Infrastructure Policy for Airports

(change, relative to current practice, in billions of 1988 dollars, positive values indicate an improvement)

Item	*Efficient Pricing and Runway Investment*	*Efficient Pricing Current Runway Investment*
Consumer surplus change from landing and takeoff fees[a]	1.10	−12.53
Reduced delay to travelers	7.91	3.62
Carriers' operating cost savings	2.77	1.23
Airport revenues less costs	−0.77	11.50
Total welfare change	11.01	3.82

Source: Morrison and Winston (1989b), pp. 61–112.

[a] The consumer surplus change measures the effect of changes in landing and takeoff fees on travelers who continue to fly and those who are driven from or attracted to airline travel.

increase, would remain uncompensated and mount heavy opposition to this change.[12]

Combining efficient pricing and investment would postpone the need to build expensive new airports. The FAA estimates that the new Denver airport will reduce current delays at ~~the Denver~~–Stapleton airport by 35 percent to 50 percent. Optimal pricing and investment at Stapleton would lower delays by at least that much at lower costs (Morrison and Winston, 1989b). Continued growth in air travel will eventually necessitate constructing new airports, but these decisions will be made more efficiently if we make better use of our current airport capacity.

Because airports are characterized by overall constant returns to scale (Morrison, 1983), they would be financially self-sufficient under optimal pricing and investment. Their self-sufficiency would help lower the federal government deficit because airports would not need funds from the government to finance improvements.

Efficient Air Transportation Policy and Deregulation

Deregulation of the airline industry has been a success. Morrison and Winston (1986, 1989a) find that deregulation has provided travelers and carriers with \$14.9 billion of annual benefits (1988 dollars).[13] But by lowering fares and accelerating the development of hub and spoke route structures, deregulation has increased the flow of traffic at major airports, which has strained airport capacity and caused delays. Despite popular belief, the source of the delays is not deregulation per se but the failure of airports to undertake optimal pricing and investment. The increased flying activity in the deregulated environment makes this failure all the more costly; Morrison and Winston (1989b) estimate that the potential benefits of deregulation have been lowered by at least \$2 billion because of greater travel time.

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[12] General aviation was successful in its opposition to the landing fee increase at Logan (Boston) Airport. But the revised prices at Logan were only applied to small aircraft (fees were actually lowered for larger planes to keep the plan revenue neutral) and were not differentiated by time of day.

Today, all airports in the U.S. are publicly owned, usually by local government agencies. Airports' contributions to investments in capacity are financed by bonds that are effectively guaranteed by the airlines. Efficient pricing and investment could reduce the airlines' control over airport investments, especially ones that would enable competitors to have easier access to the airport, because airports would be financially self-sufficient. It has been argued that under use agreements between airlines and airports, airlines can block airport investments in capacity that require them to pay additional fees. By expanding capacity, efficient pricing and investment could also reduce entry barriers that exist at certain airports because carriers are unable to get takeoff and landing slots. (Of course, these additional competitors would need to obtain gate space, also.) New entry could be facilitated, putting downward pressure on fares and adding to the benefits from deregulation.

Toward Efficient Infrastructure Policy

The potential exists to realize substantial benefits from an efficient infrastructure policy. The annual welfare gain from efficient pricing and investment of highways and airports advocated here approaches \$25 billion, and it can be obtained for only about \$2.7 billion in annualized capital expenditures to increase road thickness and to build more runways. Benefits would actually be higher than these estimates suggest because performance in the deregulated airline and trucking industries would improve. And efficient infrastructure policy can at the same time effectively address the major concerns with deregulation, air travel delays and entry barriers at airports. The conclusion is clear and inescapable: public spending on infrastructure should certainly be increased, but it should be done efficiently and be accompanied by efficient pricing. Indeed, efficient pricing is a prerequisite to making efficient infrastructure investments.[14]

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[13] This positive conclusion has been corroborated by a recent study (Morrison and Winston, 1990) that compares deregulated and hypothetically regulated air fares since deregulation in 1978 through 1989.

Leadership at the federal level would help shape an efficient infrastructure policy. One useful step would be for the federal government to require that requests for federal grants for highway and airport capacity improvements include a plan to reduce capital needs by efficient pricing and efficient investment. Unfortunately, current federal policy as stated in the National Transportation Plan (U.S. DOT, 1990) only mentions efficient pricing and investment in a vague way, if at all, and usually refers to it in connection with inefficient policies.

The best hope for sensible policy reform may reside with the states. Oregon has recently introduced an axle-weight tax for selected trucks and several locales in California are seriously exploring congestion pricing. There has also been support in California newspapers for congestion pricing (see the editorials cited in Small, Winston, and Evans (1989), p. 92). These states have recognized (and perhaps others will too) that the current federal emphasis on supporting increases in infrastructure spending with such means as higher state gasoline taxes will fail to provide a permanent solution to recurring infrastructure problems. Steps must be taken to stop passing these problems on to future generations.

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[14] Some readers may be familiar with the work of Aschauer (1989), who estimates time series regressions that attempt to explain the impact of the nonmilitary public capital stock on the nation's productivity, and finds very powerful effects. In fact, the effects he finds are too powerful.

Consider a one-time lump-sum $60 billion increase in infrastructure spending. An increase of this magnitude in 1985 would enable public works capital spending to regain its 1960 share of GNP. This lump-sum investment represents a 6 percent increase in the value of the infrastructure stock. Using Aschauer's elasticity estimate of .24 for the change in productivity with respect to the change in the infrastructure capital stock leads to a 1.4 percent increase in current output from the investment or a $70 billion gain in the first year. With conservative parameters, the present value of the gain in future years would exceed $600 billion, for a benefit-cost ratio of 10:1.

This return is implausible. Charles Schultze (1990) argues Aschauer's findings simply demonstrate that the time pattern of productivity and public investment growth are similar (both rising in the 1950s and 1960s, and both falling in the 1970s and 1980s), and that this correlation generates grossly inflated estimates of the return to public infrastructure investment.

References

American Association of State Highway and Transportation Officials, *AASHTO Guide for Design of Pavement Structures*, Washington: AASHTO, 1986.

Aschauer, David Alan, "Is Public Expenditure Productive?" *Journal of Monetary Economics*, March 1989, *23*, 177–200.

Catling, Ian, and Brain J. Harbord, "Electronic Road Pricing in Hong Kong, 2: The Technology," *Traffic Engineering and Control*, December 1985, *26*, 608–615.

Downs, Anthony, "The Law of Peak-Hour Expressway Congestion," *Traffic Quarterly*, July 1962, *16*, p. 393.

Governors' Task Force Report, Presented to National Governors Association, Chicago, IL, August 1989.

Joint Economic Committee, United States Congress, "Public Investment in Infrastructure," July 1989.

Lee, Douglas B., "New Benefits From Efficient Highway User Charges," *Transportation Research Record*, 1982, no. 858, 14–20.

Mohring, Herbert, and Mitchell Harwitz, *Highway Benefits: An Analytical Framework*, Evanston, IL: Northwestern University Press, 1962.

Morrison, Steven A., "Estimation of Long-Run Prices and Investment Levels for Airport Runways," *Research in Transportation Economics*, 1983, *1*, 103–130.

Morrison, Steven, and Clifford Winston, *The Economic Effects of Airline Deregulation*. Washington, DC: The Brookings Institution, 1986.

Morrison, Steven A., and Clifford Winston, "Airline Deregulation and Public Policy," *Science*, August 1989a, *245*, 707–711.

Morrison, Steven A., and Clifford Winston, "Enhancing the Performance of the Deregulated Air Transportation System," *Brookings Papers on Economic Activity: Microeconomics*, 1989b, 61–112.

Morrison, Steven A., and Clifford Winston, "The Dynamics of Airline Pricing and Competition," *American Economic Review, Papers and Proceedings*, May 1990, *80*, 389–393.

Pitt, David E., "Tolls or No, Traffic Gets Worse," *New York Times*, September 1989.

Schultze, Charles L., "The Federal Budget and the Nation's Economic Health." In Aaron, Henry, ed., *Setting National Priorities: Policy for the Nineties*. Washington, DC: The Brookings Institution, 1990.

Small, Kenneth A., "The Incidence of Congestion Tolls on Urban Highways," *Journal of Urban Economics*, January 1983, *13*, 90–111.

Small, Kenneth A., and Clifford Winston, "Optimal Highway Durability," *American Economic Review*, June 1988, *78*, 560–569.

Small, Kenneth A., Clifford Winston, and Carol A. Evans, *Road Work: A New Highway Pricing and Investment Policy*. Washington, DC: The Brookings Institution, 1989.

Time, "Gridlock! Congestion on America's Highways and Runways Takes a Grinding Toll," September 12, 1988, 52–60.

Transportation Research Board, National Cooperative Highway Research Program, "Relationships Between Vehicle Configurations and Highway Design," National Research Council, Washington, DC, November 1986.

United States Department of Transportation, *Moving America: New Directions, New Opportunities*. Washington, DC, February 1990.

Viton, Philip A., "Pareto-Optimal Urban Transportation Equilibria," *Research in Transportation Economics*, 1983, *1*, 75–101.

Winston, Clifford, "Conceptual Developments in the Economics of Transportation: An Interpretive Survey," *Journal of Economic Literature*, March 1985, *23*, 57–94.

Winston, Clifford, Thomas M. Corsi, Curtis M. Grimm, and Carol A. Evans, *The Economic Effects of Surface Freight Deregulation*. Washington, DC: The Brookings Institution, 1990.

THE ROLE OF PARKING CHARGES IN HIGHWAY CONGESTION PRICING

Testimony Presented to United States Senate
Subcommittee on Water Resources,
Transportation, and Infrastructure

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March 21, 1991

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Increasing traffic congestion in many of the nation's cities, together with alarming projections of its future growth, have been widely cited as evidence of the need for the federal government to embark upon a major new program of highway construction. Yet for at least three decades, economists have recognized that the problem of peak-hour traffic congestion is a consequence not of underinvesting in road and highway capacity, but of failing to charge motorists adequately for their use of these facilities during morning and evening rush hours. For nearly as long as they have recognized the source of the congestion problem, economists have proposed that it be remedied by sophisticated pricing schemes designed automatically to charge motorists tolls that vary by time of day, location, and direction of travel. Road pricing prescriptions have historically met with even less enthusiasm than has the argument that congestion is a problem created by mispricing rather than by underinvestment, in part because they proposed equipping much of the nation's automobile fleet with sophisticated electronic equipment that would be costly to produce and of uncertain reliability in everyday service.

While other concerns about the manageability and invasiveness of complex road pricing schemes remain, continuing advances in electronics technology and declines in the cost of such equipment suggest that it may now be time to reconsider any technologically-based opposition to the idea. At the very least, the time has certainly arrived to remove any remaining restrictions on time-variant pricing of highways constructed with federal financial assistance, and to encourage states and local governments to conduct pilot or demonstration programs designed to assess the difficulties in implementing roadway pricing and to identify the likely responses of motorists to the imposition of such charges on a wider scale. At the same time, it would seem useful to resurrect the once active federal interest in promoting demonstrations of less complicated substitutes for electronic road pricing, including the pricing of downtown parking space, Singapore-style area licensing requirements, and priority treatment of carpools and transit vehicles on urban streets and highways.

One of these, the pricing of commuter parking space in the downtowns and other densely developed areas of U.S. cities, is the focus of my testimony today. I believe that in the absence of a comprehensive system of time-variant tolls for street and highway use, more rational pricing of the parking spaces used by automobile commuters is one of the most important objectives that federal transportation policy should seek to promote. In particular, federal tax policies should be revised to curtail the provision of free and below-market price parking space to employees who commute to work in heavily congested areas of our nation's cities. I certainly appreciate that reforms in tax policy are not officially the province of this Committee. Yet I believe that the widespread employer subsidization of employee parking fostered by current federal tax policy exercises an immensely powerful influence on commuting behavior. In deliberating whether to support a major new federal program of highway construction, this Committee's members should appreciate the extent to which the subsidization of parking in urban areas -- as distinct from the systematic underpricing of street and highway use -- increases pressures for profligate highway spending.

The Problem of Employer-Subsidized Parking

More than three-quarters of those who drive to work in U.S. cities use parking that is provided by their employers, for which 90 percent pay no charge.[1] Although some employer-provided parking is located in low-density suburban areas, many commuters who receive free parking work downtown or in densely developed suburban centers, where the price of parking would provide a powerful inducement to use transit or join a carpool if their employers did not supply it free. For example, 64 percent of auto drivers crossing the Hudson River on route to the Manhattan CBD during the morning rush hours park their cars in spaces that are completely or partly paid for by their employers.[2] And in Washington, the federal government and the region's private employers together provide free parking for nearly 100,000 automobiles, or almost half of all those driven to work during peak commuting hours.[3]

By offering free parking, employers substantially reduce the cost at which their employees can drive to work. For many employees, the availability of free parking at work represents a stronger incentive to drive than if their employers offered instead to provide them with free use of an automobile and free gasoline for the trip. Trips to work by automobile in U.S. cities average just under twenty miles (for the round trip), over the course of which an automobile costs less than $5.00 to own and operate.[4] Yet in the downtown area of almost any major U.S. city, an employer's offer of a free parking space is worth much more than this amount. Even in many of the nation's suburban office centers, where employment is growing most rapidly, daily parking prices of this level and above are increasingly common.[5]

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[1] Federal Highway Administration, Nationwide Personal Transportation Study, 1969, Table 22. More recently, this same figure is reported in Center for Urban Transportation Research, University of South Florida, Factors Related to Transit Use, 1989.

[2] Port Authority of New York and New Jersey, 1984 Survey of Trans-Hudson Automobile Commuters, October 1984.

[3] Metropolitan Washington Council of Governments, Parking Management Policies and Auto Control Zones, Report DOT-OS-40045-1, June 1976.

[4] Automobile trips to work average 9.9 miles (each direction) in U.S. cities; see Federal Highway Administration, Personal Travel in the U.S., Volume I of the 1983-84 Nationwide Personal Transportation Study, August 1986, Table 7-6, p. 7-9. Costs associated with ownership of a typical automobile (depreciation, financing charges, and licensing and registration fees) currently average $0.181 per mile including all costs associated with ownership of the vehicle itself, while gasoline consumption adds another $0.054 per mile; see American Automobile Association, "Your Driving Costs," 1989 edition, p. 5. These costs would thus total $4.65 over the course of a typical round trip to work. (Even at more recent gasoline prices of up to $1.50 per gallon, gasoline costs average approximately $0.068 per mile, bringing daily round-trip commuting costs to slightly more than $4.90.)

[5] See for example Sheila A. Henry and Roberta Valdez, "Analysis of Parking Charges and Costs per Employee by Travel Analysis Areas in Orange County," Planning Department, Orange County Transit District, July 1989, Appendix.

It should come as no surprise that an incentive this strong overwhelms any inducement for employees to commute by public transit that is currently offered by partial tax exemption of the value of employer-supplied transit passes. At most, a free transit pass can be worth about $270 in annual taxable salary, and is often worth nothing because the tax exemption of its value is limited under the *de minimis* rule adopted as part of the 1984 Tax Reform Act.[6] In contrast, employers' offers of free parking are typically equivalent to salary increases four times as large, and can range in value up to *ten or more times* that amount.[7] Even the combination of exempting from taxation part of the value of transit passes with generous federal, state, and local transit subsidies -- which now exceed $10 billion annually -- has proven woefully inadequate to counteract such a powerful incentive for employees to commute by automobile. This should not be surprising either, since under the most optimistic assumptions these subsidies reduce the average fare for a round trip to work using public transit by slightly more than $3.00, while an employer's offer of a free parking space typically reduces the cost of driving to work by *at least* this amount, and often by much more.[8]

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[6] Under the Tax Reform Act of 1984, employer-provided transit passes worth up to $15 per month may be excluded in computing their recipients' federal income taxes. Under the so-called *de minimis* rule, however, the Act also provides that if the value of the pass exceeds $15 per month, its entire value is treated as taxable income. For an employee in the highest marginal tax bracket (33%), an untaxed benefit with a cash value of $15 per month is equivalent to $268.66 per year in taxable income. In contrast, the best available estimate is that the value of a free parking space averages $58 per month in U.S. cities, nearly four times the $15 maximum value of a transit pass; see Testimony of the American Public Transit Association Before the Committee on Ways and Means of the U.S. House of Representatives on Federal Tax Laws and the Environment, March 14, 1990, p. 12. An employer's offer of a free parking space that would otherwise cost $7 per day -- a comparatively modest charge in many U.S. cities -- is equivalent to an increase in taxable income of more than *ten times* as large as the maximum value of a free transit pass (to be exact, $2,758, slightly more than ten times the $268.66 figure) to an employee in the highest tax bracket.

[7] The best available estimate is that the value of a free parking space averages $58 per month in U.S. cities, nearly four times the $15 maximum value of a transit pass; see Testimony of the American Public Transit Association Before the Committee on Ways and Means of the U.S. House of Representatives on Federal Tax Laws and the Environment, March 14, 1990, p. 12. An employer's offer of a free parking space that would otherwise cost $7 per day -- a comparatively modest charge in many U.S. cities -- is equivalent to an increase in taxable income of more than *ten times* as large as the maximum value of a free transit pass (to be exact, $2,758, slightly more than ten times the $268.66 figure) to an employee in the highest tax bracket.

[8] Total subsidies paid to urban transit operators by federal, state, and local governments amounted to just over $10.5 billion during 1988, while the number of (linked) trips made by transit totaled about 6.5 billion; these data are estimated from Urban Mass Transportation Administration, *1988 Section 15 Annual Report*, Tables 2.02.2, 2.04.2, and 2.13. Thus even if none of this assistance were wasted in the form of higher costs or unutilized service, and all of it were available to underwrite lower fares, the resulting fare reduction would be just under $1.63 per one-way transit trip, or about $3.25 for a round trip to work by transit. (It is possible that this figure underestimates the fare subsidy for commuting to work by transit. On one hand, the

Evidence of Free Parking's Effect

The most direct evidence of the effect free parking can have comes from commuters' responses to their employers' decisions to begin charging employees for parking they formerly provided free. When the Los Angeles area's ridesharing agency phased in market rates for employee parking, the fraction driving alone to work declined from 42 percent to 8 percent, while the share of carpool participants rose from 17 percent to 58 percent of the agency's employees.[9] When charges equal to 50 percent of commercial rates were imposed for parking at selected federal buildings in the Washington, D.C. area for a brief period during 1979 and 1980, the number of employees driving alone declined by as much as 40 percent at some sites.[10] Similarly, when parking prices equal to 70 percent of market rates -- then only about $1.00 U.S. per day -- were imposed on Canadian government employees in Ottawa, the number driving alone to work declined by 23 percent, while commuting by transit increased correspondingly.[11] A variety of other evidence, which has been summarized in great detail elsewhere, confirms the substantial effect that employer-paid parking can have on commuting behavior.[12] When all of the available evidence is considered together, the best estimate appears to be that at least 20 percent of commuters who now drive alone would instead choose to carpool or use public transit if they were required to pay market rates for parking they now receive free of charge.

Peak hour auto commuting is largely responsible for increasingly widespread urban and suburban traffic congestion, and also contributes heavily to both air

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subsidy transit work trip would be much greater than this average figure, since a disproportionate share of both capital and operating costs for transit are accounted for by peak service, and most work trips are made during peak travel hours; see Thomas E. Parody, Mary E. Lovely, and Poh Ser Hsu, "Net Costs of peak and Off-Peak Transit Trips Taken Nationwide by Mode," paper presented to the Transportation Research Board 69th Annual Meeting, Washington, D.C., January 1990. On the other, there is substantial evidence that as much as three-quarters of all public assistance to transit operators is unavailable to subsidize lower fares, because it is absorbed by higher operating expenses or more extensive service; see Don H. Pickrell, The Causes of Rising Mass Transit Deficits, Report MA-11-0037, Harvard University, July 1983.)

[9] Monica Surber, Donald Shoup, and Martin Wachs, "Effects of Ending Employer-Paid Parking for Solo Drivers," Transportation Research Record, Number 957, 1986, pp. 67-71.

[10] Gerald K. Miller and Carol T. Everett, "Raising Commuter Parking Prices: An Empirical Study," Transportation, Volume 11 (1982), pp. 105-129.

[11] Transport Canada, The Effects of the Imposition of Parking Charges on Urban Travel in Ottawa: Summary Report, Report TP 291, February 1978, p. 11.

[12] The evidence available at the time was summarized in Don H. Pickrell and Donald C. Shoup, "Employer Subsidized Parking and Work Trip Mode Choice," Transportation Research Record, Number 786 (1980), pp. 30-38. For a more recent review, Donald C. Shoup and Richard W. Willson, "Employer-Paid Parking: The Influence of Parking Prices on Travel Demand," Proceedins of the Commuter Parking Symposium, Association for Commuter Transportation and Municipality of Metropolitan Seattle, Seattle, Washington, December 6-7, 1990.

pollution levels in our cities and the transportation sector's substantial energy demands. Thus employers who encourage their employees to drive to work by providing free parking contribute significantly -- if unwittingly -- to urban traffic congestion, and thus to the growing pressure for major new federal highway spending initiatives. These employers' policies also exacerbate the severe environmental consequences and energy consumption patterns stemming from our nation's nearly exclusive reliance on the automobile for urban travel.

Why is Employer-Paid Parking So Widespread?

The major reason that so many employers provide free or below-cost parking to their employees is that its value is exempted from reporting and taxation as income. For those who drive to work, the tax-exempt status of free parking makes it worth more in after-tax income than a salary increase equal to the cost of parking. The difference between the value of an employer's offer of a free parking space and an increase in taxable salary sufficient to purchase that same space rises in direct proportion to the marginal federal income tax bracket in which each employee's taxable income places her or him.[13] Thus an employer can make most of its employees better off for a given outlay on employee compensation by spending part of it on parking that is subsequently offered free (or at least at below-market prices) to employees, rather than paying it in the form of higher salaries.

The tax-exempt status "enjoyed" by employer-provided parking stems from its classification under the Tax Reform Act of 1984 as a "working condition fringe benefit."[14] The rationale for exempting such benefits from income taxation is to encourage employers to provide desirable working conditions, and thus to increase employment and to encourage higher productivity. In so doing, federal tax law ignores the behavioral linkage between the availability of convenient, free parking at the workplace and the decision to drive an automobile to work, as local zoning codes do in requiring minimum amounts of parking space to be provided at employment sites. While it is difficult to judge whether this represents sound employment policy, it clearly amounts to misguided transportation policy.

Although commuting to work is a necessary cost incurred in earning a living, it is difficult to imagine why doing so by automobile warrants continued (if indirect) federal subsidy of such generous degree, particularly when so many other federal policies (as well as those adopted by state and local governments) simultaneously attempt to discourage driving. Unlike the tax exemption of fringe benefits such as health insurance and retirement savings, which encourages behavior that federal policy deems socially responsible, exempting the value of employer-provided parking from income taxation rewards behavior that aggravates transportation problems and their environmental consequences. In addition to providing strong incentives for private employers to provide free parking, the federal government is a direct provider of free parking on a large scale. There are approximately two million civilian federal employees, an unknown fraction of whom receive free parking if they choose to drive to work. Whatever their exact number, government has traditionally served as a leader by providing fringe benefit packages that are subsequently emulated by private employers, and which commonly entitle their recipients to free parking at their places of work.

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[13] This effect is exacerbated where state and local income tax rates also rise with an employee's taxable income.

[14] U.S. Internal Revenue Code, 1984, Section 132, 1.132-5T(p).

What Can be Done?

The ideal solution to the problem of widespread employer subsidization of employer parking would be to amend the federal tax code to reclassify employer-provided parking as a taxable fringe benefit. Employers would thus be required to estimate and report its cash value, in the same way they now treat most other fringe benefits, and their primary motivation to provide parking would be eliminated. Parking benefits would still be subject to the de minimis rule, so that employers who provided parking with a low market value (and thus did not induce much increased auto travel among their employees) would not be subjected to burdensome accounting and reporting requirements. Although reforming any policy with so many beneficiaries is destined to be politically unpopular, it would have one desirable effect, at least from the viewpoint of the Federal budget: it would raise federal tax revenues, initially by as much as $5 billion dollars annually.[15] However, the revenue-generating potential of taxing employer-provided parking would decline over time, as eliminating the major inducement for employers to supply it caused progressively more of them to abandon the practice, and instead to encourage commuting by carpools and public transit.

At the very least, present federal tax policy should be changed to require that employees who offer subsidized parking also offer their employees the option of receiving the amount of that subsidy (the difference between the market value of parking that is made available and what the employee is required to pay for it) as taxable income. Since no employee would be required to exercise this option, such a change seems likely to arouse considerably less political opposition than the direct approach of taxing the value of employer-provided parking. While some employees would be deterred from exchanging their parking places for cash by the latter's taxable status, others would prefer the resulting increase in after-tax income to the continued availability of a below-market parking space. Most important, the option of choosing cash instead of a parking space would be most attractive to employees who commute to locations where market parking prices are highest, thus targeting the incentive to stop driving alone where traffic congestion is most severe, the air is most polluted, and transit service is most readily available.[16]

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[15] The annual increase in federal income tax liability for an employee receiving a free parking space worth the previously-cited average of $58 per month would range from $104 to almost $230, depending on the employee's taxable income level. At the current average value of the marginal federal income tax rate of 24%, the increased annual tax liability for a commuter receiving a free parking space of average market value would reach $167. If three-quarters of the more than 28 million commuters working in the central city areas of the nation's large cities (those over 500,000 population) receive free parking (as the earlier Nationwide Personal Transportation Survey indicated), taxation of its value would yield $4.67 billion annually at the current distribution of taxpayers among marginal tax brackets. (The 1980 Census revealed that 28.2 million employees commuted to central city jobs in U.S. cities with populations over 500,000; see Alan E. Pisarski, Commuting in America, The Eno Foundation for Transportation, Inc., 1987, Table 3-4, p. 40.) In fact, the increase in tax revenues would probably exceed this figure, because recipients of the highest-valued parking spaces tend to be those in the highest marginal federal tax brackets.

Alternatives to Taxing Free Parking

A variant of the proposal to tax the cash value of employer-provided parking -- although one without its revenue-generating potential -- would be to amend the federal tax code to permit employers to classify some limited amount of each employee's gross earnings as a tax-exempt "travel allowance." Employees who currently drive to work could use the resulting increase in their after-tax incomes to pay for parking, but those who decided to commute by other means could reserve part of the increase for other purposes.[17] The size of such an allowance could be tailored to produce any desired revenue impact on the federal budget, including "revenue neutrality," by balancing the additional revenue from taxation of the value of parking above the allowance against the reduction in revenues from increasing the amount of income that is deductible in determining individuals' tax liability. In effect, this would amount to an increase in the standard deduction from earnings, except that even those who itemized deductions would be eligible to claim it, as long as their employers did not also provide them with free parking. Allowing employers to pay a tax-exempt travel allowance would explicitly recognize that commuting to work is a cost necessarily entailed in earning an income, yet would allow employers to compensate workers for this cost without encouraging them to commute by automobile.[18]

Several others alternatives to attacking the problem directly -- that is, to taxing the value of employer-provided free parking as income -- have also been proposed. These include eliminating the deductibility of expenses incurred by employers in providing parking for purposes of computing their corporate tax liabilities, imposing on employers a federal excise tax on the value of free parking they provide to their employees, and levying a uniform per-space federal tax on owners or operators of parking facilities. These proposals share the properties that they are likely to be less effective in discouraging automobile commuting than direct taxation of the value of free parking to its recipients, yet similarly complex to administer and enforce, and at least as difficult politically to implement.

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[16] For a detailed discussion of this proposal, see Donald C. Shoup and Richard W. Willson, "Employer-Paid Parking: The Influence of Parking Prices on Travel Demand," Proceedins of the Commuter Parking Symposium, Association for Commuter Transportation and Municipality of Metropolitan Seattle, Seattle, Washington, December 6-7, 1990.

[17] This proposal was originated by Donald Shoup, and was first discussed in Donald C. Shoup and Don H. Pickrell, Free Parking as a Transportation problem, Report DOT-OS-80011, Office of University Research, U.S. Department of Transportation, June 1979.

[18] For a more detailed discussion of this proposal, see Donald C. Shoup, "Cashing Out Free Parking," Transportation Quarterly, July 1982 (Volume 36), pp. 35-64.

Most important, each of them appears less likely to result in a change in the price employees face when deciding whether to commute to work by automobile than does taxing employer-provided parking as income, since each would tax the *provision* rather than the *receipt* of parking that is priced below its market value. While each would raise the cost to the employer of providing employee parking, none could ensure that employers would respond by raising the price of parking faced by their employees, which would be an inescapable result of taxing the value of free parking to its recipients. Some employers might respond by simply absorbing the increased cost of purchasing parking, since doing so would produce a partially offsetting reduction in an employer's corporate tax liability.

Eliminating the deductibility of expenses incurred by employers in providing parking is also objectionable because it would arbitrarily single out one type of expense for different treatment from that accorded all other legal business activities. Whatever its virtues as transportation policy, which even at best are inferior to those of taxing employer-provided parking as individual income, the added complexity that such a measure would introduce into the already overly complicated federal income tax code makes it undesirable as tax policy. In contrast, taxing the value of parking as individual income would bring its treatment under the tax code into conformity with that accorded most other fringe benefits, and could thus justifiably be classified as one small step toward rationalizing federal income tax policy.

At the same time, the proposal to end deductibility of employers' expenses for providing parking suffers from all of the same difficulties of valuation and enforcement that would beset taxation of parking as a fringe benefit, since these stem from the variety and complexity of arrangements under which employers acquire parking for the purpose of distributing it to their employees.[19] Levying a federal excise tax on the value of parking provided by employers is subject to exactly this same criticism, as well as to the aforementioned objection as a tax policy of dubious merit. Finally, singling out parking expenses for non-deductibility by corporations would penalize those employers who purchase or construct parking to provide to their employees at *un*subsidized prices, by raising their corporate tax liabilities, hardly a desirable message for public policy to convey.

The proposal to levy a uniform tax per parking space suffers from far worse drawbacks than even these other questionable endeavors. First, it would be assessed on both spaces that are now provided free to commuters and those for which a market price is now paid, thereby failing to differentiate between "offending" parking spaces and more benign ones. More important, there is no guarantee that whatever portion of such a tax was shifted forward to employers purchasing or providing parking on behalf of their employees would not simply be absorbed by those employers who already subsidize employee parking, thereby neutralizing its intended effect on commuter behavior. Unless coupled with elimination of the deductibility of parking expenses, in fact, part of employers' increased costs for parking would be offset by savings in corporate income taxes, and thus absorbed by general taxpayers rather than by automobile commuters.

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[19] A detailed discussion of the various arrangements under which employers acquire and provide parking is contained in "Transit and Parking: Public Policy," Office of Budget and Policy, Urban Mass Transportation Administration, March 1989, pp. 4-7.

A Step in the Right Direction

Raising the current tax exemption of employer-provided transit passes and vanpool benefits from the $15 monthly ceiling established by the 1984 Tax Reform Act's de minimis rule, as the Chairman of this Subcommittee and several others in Congress have advocated, would by itself represent a worthwhile first step toward more balanced subsidies to transit and highway travel. Ideally, however, such action should accompany rather than substitute for actions to reduce subsidies for the usage and parking of automobiles in congested urban areas. By itself, increasing the already substantial subsidies to high-occupancy modes is not likely to draw many commuters out of automobiles, simply because the costs of commuting by alternate modes will remain nearly irrelevant to most employees' decisions to drive to work as long as free parking continues to be so widely available.

Raising the tax exemption of employer-provided transit and vanpool subsidies could still help bring about more rational pricing of urban transportation, however, if offered as a quid pro quo for subjecting at least some part of the value of employer-provided parking to income taxation. One promising proposal would be to couple an increase in the value of transit and carpool benefits exempted from income taxation to some dollar threshold (say, $50 per month) with taxation of any value of employer-provided parking in excess of that amount, with the exact value of the threshold set to achieve the desired overall effect on federal tax revenues. For example, the policy could be made "revenue neutral" by adjusting this figure to balance the increase in revenue from taxing the value of free parking above it against the revenue loss from exempting that amount from taxation if provided in the form of transit assistance.

The Importance of Congressional Action

There is no better lesson in the futility of attempting to raise subsidy levels for alternate modes to offset those for automobile travel than the experience of the past decade, during which government outlays to promote expanded transit service and lower fares totaled nearly $100 billion, while the historical decline in transit's relative importance as a means of commuting and the dramatic growth of automobile travel both continued unabated.[20] During this same time, outlays to construct new and expanded highway facilities in the nation's cities amounted to nearly three times this figure.[21] Yet in the face of these massive investments in both improved transit service and expanded highway capacity, traffic congestion escalated dramatically, while the environmental quality of many of our nation's cities continued to deteriorate. By now, it should thus be clear that in the presence of strong financial incentives to drive an automobile, even a dramatically expanded program of highway construction cannot prevent the intensification of traffic congestion in the downtown areas of out nation's cities, or forestall its continuing spread to their suburban areas. While the systematic underpricing of street and highway capacity represents one pervasive incentive to drive, an equally powerful inducement stems from the widespread provision of free parking by employers that federal tax policy now encourages.

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[20] This figure, which is expressed in today's dollars, was tabulated from Urban Mass Transportation Administration, National Urban Mass Transportation Statistics: Section 15 Annual Report (annual), various issues. The fraction of workers commuting by public transportation declined from 7.3 percent during 1969 to 5.7 percent in 1977, and further to 5.3 percent by 1983. At the same time, the fraction of all trips in U.S. urban areas -- including those for purposes other than commuting to work -- made by public transit declined from 2.4 percent during 1977 to 2.2 percent in 1983. These data are reported in Federal Highway Administration, Personal Travel

What the phenomena of intensifying traffic congestion, declining transit use, and deteriorating air quality share in common is one important root cause: layer upon layer of subsidies to automobile travel, both direct and indirect, by all levels of government. One of the most important of these, the widespread provision by employers of free parking for those who drive to work, is readily amenable to Congressional action to eliminate it. Although taking such action will require members to display conviction and leadership rather than bowing to political expediency, the time for doing so has clearly arrived. The alternative is another decade of decline in transit's role in our nation's urban transportation system, spreading urban and suburban traffic congestion, and deteriorating environmental quality, while annual federal spending levels for both highways and public transit continue to escalate. By taking this decisive step toward more rational pricing of automobile travel, Congress can act to reverse one of the most critical defects of current federal transportation policy, thereby improving both the functioning of our nation's transportation system and the quality of our urban environment.

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in the U.S.: Volume I, 1983-84 Nationwide Personal Transportation Study, August 1986, Table 7-6, p. 7-9, and Table 6-7, p. 6-6.

[21] Again expressed in terms of its equivalent in today's dollars, this estimated was tabulated from Federal Highway Administration, Highway Statistics (annual), various issues.

International Bridge, Tunnel and Turnpike Association

Written Testimony of

Allan V. Johnson

Past President, IBTTA

and

Executive Director and
Assistant Secretary-Treasurer

Ohio Turnpike Commission
Berea, Ohio

Water Resources, Transportation, and Infrastructure Subcommittee
of the
Senate Environment and Public Works Committee

Washington, D.C.

March 21, 1991

Congestion Pricing

My name is Allan V. Johnson, and I am Executive Director of the Ohio Turnpike Commission in Berea, Ohio. I am Past President and currently serve as Government Affairs Task Force Chairman of the International Bridge, Tunnel and Turnpike Association (IBTTA). It is my pleasure to present these written remarks for the record.

IBTTA is the worldwide association representing the toll industry, with members in 19 countries on five continents totalling 84 agencies. There are almost 5,000 miles of toll roads, bridges and tunnels in the United States, about half of which are on the Interstate system.

The Association supports and promotes the use of toll financing as an effective alternate or supplement to tax financing of the design, construction, operation and maintenance of transportation facilities wherever it is practical, feasible and prudent.

We realize the importance of this Committee's task in helping to shape a future federal highway program that will enable the nation to keep pace with our rapidly growing traffic demands. We also appreciate this opportunity to discuss with you the role of electronic toll collection when implementing congestion pricing mechanisms. As congestion pricing is just one issue to be addressed, IBTTA sincerely looks forward to assisting you during the entire federal highway reauthorization process.

Our industry is excited about recent progress in toll collection technology and its potential for the future.

For more than 20 years, we referred to electronic toll collection as Automatic Vehicle Identification, or AVI. The term "AVI" is misleading, however, and doesn't reflect the broad potential of electronic toll collection and related technology. We now refer to these technologies as Electronic Toll & Traffic Management, or ETTM.

Recent advances in ETTM technology offer the toll industry the ability to automatically collect tolls in an accurate, efficient and cost-effective manner that is acceptable to the motorist.

This state-of-the-art technology allows participating drivers to pass through a toll plaza without stopping by paying their tolls electronically. These customers can either pre-pay with cash, or set-up an account with a credit card and then be billed later.

Those drivers who choose not to participate are able to go through a lane and "manually" pay the toll, while ETTM customers enjoy the convenience of hands-free non-stop toll collection.

Some new toll roads already are being designed without traditional toll booths on the main line of the roadway. Motorists will be able to pay tolls at highway speeds as they pass a toll collection point on the toll road. Those who choose not to participate in an ETTM system will be able to exit the main line and enter a toll booth on a service road parallel to the road.

Toll agencies are committed to providing a safe environment for the motorists, for toll collection personnel, and for highway workers. Toll facilities enjoy a safety record second to none, and our industry will not compromise safety when applying this or any new technology.

Already, ETTM has a proven track record. On the Dallas North Tollway, which is operated by the Texas Turnpike Authority, experience has shown that during rush hours alone, its system provides the equivalent of two additional lanes of capacity. The bookkeeping records reveal that no errors have been made with millions of transactions, and the system is operational in all toll lanes.

The Oklahoma Turnpike Authority's ETTM system became fully operational within the last several months serving the cities of Tulsa and Oklahoma City. The response from the motoring public continues to be tremendous.

Other independent toll agencies and state departments of transportation that are studying, testing and using ETTM systems include:

CALTRANS (California DOT)
Delaware River Port Auth.
E-470 Highway (Denver, CO)
Golden Gate Bridge
Greater New Orleans Expressway
Grosse Ile Bridge (Michigan)
Illinois State Toll Highway
Louisiana DOT
Massachusetts Turnpike
Massachusetts Port Authority
New Jersey Highway Authority
New Jersey Turnpike Authority
New York State Thruway
Port Authority of NY/NJ
Trans. Corridor Agencies (CA)
Triborough Bridge/Tunnel Auth.
Virginia DOT

As these tests remain very encouraging, toll agencies in several geographic areas are pursuing inter-agency efforts aimed at achieving an unprecedented level of multi-agency cooperation and coordination to benefit the travelling public.

Toll authorities in the New York/New Jersey area formed an Interagency ETTM Policy Committee in 1987 to plan for the introduction of ETTM-based toll collection in the region. An interim system is planned for 1992, and a final system for as early as 1995.

Two of these agencies, the Port Authority of New York & New Jersey and the Triborough Bridge and Tunnel Authority, are conducting tests to help determine the potential for regional use of ETTM technology for toll collection and traffic management.

As part of this test, they will monitor ETTM traffic at two facilities which share a high level of commuter and other traffic to develop real-time data on traffic flow and congestion.

Especially regarding the traffic management study, this was made possible primarily due to the efforts of Senator Lautenberg during the appropriation process for Fiscal Years '90 and '91.

A detailed summary of many of these ETTM systems and tests will be submitted to the Committee in the next two weeks.

When legislators and policymakers deem it appropriate, ETTM already available can be adapted to provide proven, cost-effective congestion pricing systems. This may prove vital to many of our large cities which will have difficulty meeting air quality goals under the new Clean Air law.

ETTM will make it easier to implement congestion pricing mechanisms because the technology is available, the systems that are in operation work, and the public supports it.

I should add that ETTM technology and tolls are not the only means of implementing congestion pricing. Charging motorists a tax or user fee when they drive their cars into the central business district during peak commuting hours is another method to employ peak pricing. But tolls and ETTM technology are certainly a very powerful and efficient mechanism to price road usage, particularly since electronic toll collection systems will be able to determine the time a vehicle passes a toll collection point, and therefore charge a different rate during peak hours.

In addition, this technology will make toll projects more efficient. ETTM will reduce congestion at toll plazas, lower toll collection costs, increase toll booth capacity, enhance audit control, improve fuel conservation, contribute to cleaner air, reduce frustration and time lost, and provide greater service to the motoring public.

In many cases, it will delay or even eliminate physical toll plaza expansion, which will translate into added savings and less disruption and delays to travellers. In short, ETTM will revolutionize toll collection and help improve economic productivity, competitiveness and quality of life.

We will truly have smart drivers in smart cars, using smart highways and paying smart tolls.

The debate surrounding congestion or peak pricing is echoed not just on Capitol Hill, but within the transportation industry and among the motoring public. This concept, however, has an un-deserved negative connotation when we discuss financing our roadways in the United States. And it is by no means a new financing alternative in the transportation arena.

We already use peak pricing in transportation, for example, when we ride Washington's Metro and other rail systems and pay a higher fare during the morning and evening rush hour; when we arrange an out-of-town trip over a Saturday night to qualify for a lower airfare; or when we pay more to park a car during the business day in the central business district of virtually any sizeable city in the United States.

IBTTA is encouraged by the Administration's announced support for increased use of toll financing and the establishment of a Research and Technology Program to encourage ETTM and other Intelligent Vehicle/Highway Systems (IVHS) in future highway programs. No doubt it will come sooner and easier if the toll industry remains on the forefront of technological innovation.

Especially with the testing underway in the northeast that I mentioned earlier, ETTM will eventually be integrated into other IVHS systems. ETTM is more than vehicle identification, and it will eventually be much more than electronic toll collection.

While ETTM technology will allow toll agencies to improve traffic management, to measure traffic flow and density, to identify congestion, to implement congestion pricing, and to communicate this information to motorists when they can act on it in real time, toll agencies do not operate in a vacuum. Toll roads connect to tax-supported roads and the two share common traffic. So, where, city or regional networks include both toll and non-toll roads, it is very likely that ETTM and other IVHS systems will have to be linked. Our industry is positioned and prepared to help achieve such links.

Again, thank you for the opportunity to present some of the views of IBTTA.

STATEMENT

OF

DANIEL V. FLANAGAN, JR.

PRESIDENT, THE FLANAGAN GROUP, INC.

BEFORE THE

SUBCOMMITTEE ON WATER RESOURCES, TRANSPORTATION AND INFRASTRUCTURE

U. S. SENATE

WASHINGTON, D. C.

MARCH 21, 1991

Mr. Chairman, it is a pleasure to appear before the subcommittee today to present some recommendations based on four years of research coordinated with your subcommittee staff, yourself and other Members of Congress.

Before I continue, it would be appropriate to thank the many organizations who - at different times - participated in our "National Infrastructure Conference" roundtable discussions. A list of those organizations is attached. I think we all recall the hearings held in 1987 and 1988 under the umbrella cause of discerning what the status was, at the time, of our infrastructure needs. You took the initiative, by including the word infrastructure, in the subcommittee's title, and sent a signal that the future was now; and, that it was time to come to grips with this elusive public policy issue.

In recent months, we have heard over and over again the need to address infrastructure. In fact, Speaker Foley, in a recent address to the National Press Club, made it very clear that after the cessation of hostilities in the Gulf, it would be his intent to move to the domestic agenda and, specifically to education and infrastructure.

Mr. Chairman, to be specific, the National Council on Public Works Improvements Report outlined in 1988 an entire menu of areas that needed attention. Your intent was to answer the fundamental question of "what should the federal role be in the future with respect to our nation's infrastructure?" I do remember you saying many times to various audiences that programs commissioned in the fifties dealing with transportation and the like, specifically the Dwight Eisenhower-commissioned national highway network, have matured; and it was now time to determine how to address the needs of the next century.

The Administration has come forth with their transportation proposals. This Congress will indoubtedly do the same but will also be addressing the Clean Water Act, Resource Conservation Recovery Act, and other initiatives which are intertwined with our nation's infrastructure.

Mr. Chairman, in presenting this testimony today, I must tell you that it is primarily the result of four years of conversations which were conducted under the format of the ad-hoc National Infrastructure Conference that was organized to respond to your question as to the future federal role. As I mentioned earlier there are many organizations which have contributed their time and effort, and I think all of them are pleased to see that there is an opportunity to "throw long", and put a catalyst out there that will help move things along.

Indeed, It became increasingly clear to many of us and as you spoke to a number of our audiences, that there was a certain momentum contained in existing programs; and that Congressional debate would determine how those programs would be updated to meet current need. To try and revamp all of this in the name of infrastructure would create confusion and unnecessary controversy. What I think was apparent to all was the need for something new and creative, that would supplement these programs and would bring together the federal role of guidance, research, etc., with the state role of political consensus.

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Let me express then some of the underlying rationale for supporting the establishment of a National Infrastructure Corporation, a legislative proposal that you, Mr. Chairman, have introduced in the last two Congresses and to underscore in that legislation the establishment of a Congressional Commission on Infrastructure Investment that will report to the Congress as to recommendations for the design of an infrastructure investment security that will satisfy the requirements of the Employee Retirement Income Security Act (ERISA) and allow pension funds to invest in such securities and generate, as a result, new investment in our nation's infrastructure, a secure investment opportunity and construction jobs. A laudable objective that can be achieved.

The key focus of the Corporation would be to assist dedicated state infrastructure revolving funds which qualify under criteria established by Congress. The concept is that state and local officials identify their priority infrastructure projects. They will then contact their regional National Infrastructure Corporation officials and look toward combining with them, on a fifty-fifty basis, to provide the _interim_ financing for the selected infrastructure project. Assuming it meets the criteria of innovation, high-technology application, existing environmental requirements, etc., the project then is funded for its _interim planning, design,_ and _construction_ phases, until such time as the consumer enjoys the service and pays the required user fee. The Corps of Engineers will play its traditional role of monitoring the project construction on behalf of the Corporation.

Once the project is up and running with the selected user fee, the interim financing provided by the state and the Corporation revolving fund then returns to their respective agencies, to be loaned for new projects meeting the criteria.

The phenomena that has occurred, Mr. Chairman, in which I think we must focus attention on is how to take the basic function of a publicly accepted user fee and multiply its impact so that projects can move along speedily. What is obvious in today's budgetary climate is the fact that there is public consensus as to the need for certain infrastructure services to be financed through various user fee concepts.

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We have seen in many states the creation of state revolving funds. This was commented on in your subcommittee hearings as well. This trend should be encouraged as the federal government's role should be to supplement this development and to provide matching loans. So that projects, be it waste water treatment, hazardous waste removal, transportation, mass transit, etc. have a mechanism for allowing the planning, design and construction phase itself to advance. What appears to be happening now, Mr Chairman, around the country is that innovative planning and design are frustrated. They can see the user fee over the horizon and detect a public consensus for the infrastructure project but they can't get far enough along to bring it all together. Oftentimes the political consensus that is necessary at the state or local level, really doesn't shape up because the projects themselves are too far down in the planning phase and not visible enough for the public to make their preferences known. This delay causes significant cost increases which eventually forces cancellation of the project.

As a result, we have supported, as mentioned earlier, a new governmental entity to be named the National Infrastructure Corporation. The essential thrust of the Corporation would be with its initial seed capital, to serve as a lending agency to match up with dedicated state infrastructure revolving funds that have qualified with the Corporation for a 50/50 sharing in the interim funding i.e. planning, design and construction, of qualified projects around the country.

The Corporation should also have in its list of responsibilities the coordination of research and development, and the dissemination of such information.

The method of selecting projects, to be underwritten by the state and national revolving funds would be to have the state infrastructure revolving fund nominate the project based on their infrastructure priorities. As you know, states and regions have very different characteristics, and as a result priorities will differ. If states do not establish such revolving funds, then they will not be eligible to participate in the program. When the project is placed on the national priority list, for the Corporation's consideration, it will be certified that the project can be built on budget and on time.

What we would have then, as a result of the Corporation existence, Mr. Chairman, is many projects around the country moving ahead based on these interim loans. The next question, of course, vis-a-vis the Corporation is permanent financing, noting the existence of the user fee as the revenue source.

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In the case of new projects when long-term financing is established, one of the issues that we have struggled with is the following: In many instances, if not most, states and other localities will find their financing through the appropriate tax-exempt marketplace. The tax-exempt municipal bond industry has served the nation's infrastructure well these many years and will continue to do so. However, I want to underscore a critical point. Our most valued capital resource in existence in the Untied States today are, of course, our nation's pension funds. Pension funds are already tax exempt and will not invest in such tax exempt securities at the lower yields.

Pension Funds are safeguarded by the fiduciary provisions contained in the Employment Retirement Income Security Act of 1973, ERISA as it has become known. This legislation has served the nation, its pension funds and beneficiaries well and will continue to do so. Paradoxically Mr. Chairman, there is a reservoir of capital highly desirous of helping answer the infrastructure challenge. The problem in the past has been the lack of an investment vehicle, a security if you will, that pension funds can purchase under the fiduciary requirements of ERISA for their portfolios that will have an impact on infrastructure. Obviously, many of our pension funds beneficiaries are construction workers who would enjoy greater job opportunities if there was more activity in the infrastructure construction field, while having the additional benefits of a good investment return and an improvement in their quality of life. We have struggled with the issue long and hard, and I would like to repeat a request that you include in your National Infrastructure Corporation legislation a provision for a commission to report to the Congress before the end of the year as to recommendations on what needs to be done.

I oftentimes think of what was done in the housing market by the GNMA program, founded by a good and valued friend, Ray Lapin, (a fellow San Franciscan) who President Johnson nominated to head Fannie Mae. Ray had the brilliance to design the GNMA program and the rest is now, of course, history. What we want is to design an infrastructure GNMA, if you will, that pension fund trustees can put into their portfolios with the knowledge that it will help move our infrastructure process well along, provide the kind of permanent financing that is necessary, and be a secure and attractive investment for pension portfolios.

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Mr. Chairman, in conclusion it is worth noting that: The budget restrictions that Congress now is so familiar with, argues for some new approach. The basic design here is to recognize that dilemma. The Committee, when it considers the creation of the National Infrastructure Corporation, obviously will want to make some changes. They should feel comfortable in noting that the Corporation is a sustaining entity that, with the initial capital that it receives over the next three to four years, will earn interest as it makes loans, and upon repayment of those loans will then be in a position to invest elsewhere across the country. I think it will be an exciting time; it will lead to local initiative and local debate and consensus, and, more importantly, it will lead to new technologies being suggested and projects completed. It doesn't give us all the answers -- that will evolve over time -- but the National Infrastructure Corporation gives us the building block.

Thank you very much, Mr. Chairman. I would be pleased to answer any questions that you or your colleagues might have.

KEY NATIONAL INFRASTRUCTURE CONFERENCE PARTICIPANTS

American Public Works Association

National Society of Professional Engineers

National Utility Contractors Association

Public Securities Association

American Society of Civil Engineers

American Planning Association

Construction Industry Manufacturers Association

Water Pollution Control Federation

Construction Industry Institute

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PSA

Statement of Heather Ruth
President, Public Securities Association

Senate Committee on Environment and Public Works
Subcommittee on Water Resources, Transportation and Infrastructure

March 21, 1991

Thank you and good morning. My name is Heather Ruth. I am President of the Public Securities Association (PSA). PSA is the international trade organization of banks, dealers and brokers that underwrite, trade and sell the securities of American states and local governments, mortgage-backed securities, money market instruments and U.S. government and agency securities. PSA's member firms account for 95 percent of the nation's municipal securities underwriting and trading. The membership also includes all primary dealers in government securities as recognized by the Federal Reserve Bank of New York and all major dealers in mortgage-backed securities, federal agency securities and money market instruments.

I am pleased to be here this morning to testify on the role of the capital markets in infrastructure financing and about how the federal government might better assist state, local and private financing of infrastructure-related projects. I commend Senator Moynihan and the Subcommittee for holding this hearing.

I have been closely involved in the field of public finance for a number of years. Before joining PSA, I was the Executive Director of the Municipal Assistance Corporation for the City of New York (MAC). MAC is a public agency that issues debt securities on behalf of New York City. I have also served with the New York City Budget Bureau, the City's Environmental Protection Administration, and the New York City Charter Revision Commission. I currently serve as one of three appointed members of the Financial Control Board for the City of New York together with Governor Mario Cuomo, who serves as Chairman, Mayor David Dinkins, and the elected comptrollers of New York State and New York City. As a former public official and as a citizen who continues to serve in an official role of fiscal monitor, I am acutely aware of the financial problems that states and localities can face in attempting to maintain adequate levels of public investment.

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The bulk of responsibility for financing, building and maintaining our nation's infrastructure has traditionally fallen under the purview of state and local governments. Most of the nation's secondary roads, bridges, water and sewer systems, airports, public schools and other projects that come under the definition of infrastructure were planned, financed and built by states and localities. While it is true that the federal government plays a significant role in financing infrastructure by providing assistance to state and local governments through the surface transportation, water, airport and environmental construction grant programs, ultimate responsibility for building and maintaining infrastructure projects almost always falls to state or local governments themselves.

The most important tool states and localities have in financing infrastructure investment is the tax-exempt bond market. A large portion of the money state and local governments spend on infrastructure is raised through the sale of bonds to investors. The interest on state and local government bonds issued to finance public projects is generally exempt from federal taxation for most investors. Investors, therefore, demand a lower yield on their securities than they would if the interest were taxed, and state and local governments receive a lower interest rate on their debt. The federal government forgoes tax revenue on state and local government bonds in order to provide assistance to bond issuers and to encourage public investment. Tax-exemption of municipal bonds is one of the most important sources of federal aid for state and local governments. Every year, the federal government provides millions of dollars in aid to states and localities through tax-exemption while incurring no administrative or overhead costs.

The interest rate subsidy inherent in tax-exemption provides issuers with a significant reduction in financing costs. For example, as of one week ago, the yield on the U.S. Treasury's thirty-year bond was 8.19 percent. The Merrill Lynch Corporate Bond Index was at 9.37 percent. The Bond Buyer 20-bond G.O. Index, a commonly used municipal bond index that reflects the borrowing rate that might be faced by a typical tax-exempt bond issuer, stood at 7.32 percent, 205 basis points below the corporate index rate and 87 basis points below the U.S. Government's long-term borrowing rate, a basis point being one one-hundredth of a percentage point.

A specific illustration will show how important the tax-exemption is in reducing infrastructure costs to state and local governments. All jurisdictions in my home state of New York issued a combined total of more than $17 billion in long-term tax-exempt bonds in 1990, a substantial portion of which financed infrastructure projects. Thus, a difference of just one percentage point would save New York issuers $170 million in interest costs annually -- $2.6 billion in total interest over the, say, 15-year average life -- on just the bonds issued in 1990. The actual market differential for issuers in New York State is probably closer to two percentage points, measured off the comparable corporate taxable rate. If so, the savings are double: say, $5 billion over the life of the bonds issued in one typical year. Nationwide, the interest savings realized by issuers due to tax-exemption for 1990 issues would be $38 billion.

In addition to interest cost savings, tax-exempt bonds offer a number of other advantages to state and local governments. Most important, since governments usually do not command the cash resources to finance major infrastructure projects from current revenues, issuing debt allows communities to make large capital expenditures and enjoy the immediate use and benefit of infrastructure improvements, and pay for those improvements over time. In fact, it makes economic sense for communities to borrow to pay for capital improvements, so that the actual users of a public project bear the burden of payment over the life of the project, rather than those who happened to be living in a community at the time of the expenditure. Second, bonds allow states and localities latitude and flexibility in planning their financing. While a voter referendum is often required before a government may issue bonds, states as well as many localities do not need to obtain approval outside of their own constituencies to issue tax-exempt securities. Finally, issuing debt forces market tests of public projects, since investors in bonds are the ones who ultimately decide whether projects are worth financing.

One of the most attractive features to investors of municipal bonds is their tax-exemption. Consequently, only taxable entities invest in municipal securities. Tax-exempt entities, such as pension funds, do not participate in the market. Commercial banks traditionally were active players in the municipal market, but the Tax Reform Act of 1986 removed an important incentive for bank investment in tax-exempt securities, and in every year since 1986, banks have been net sellers of municipal bonds. Property and casualty insurance companies (P&Cs) have also invested significantly in tax-exempt bonds. However, the Tax Reform Act of 1986 also dampened P&C demand for tax-exempt bonds, and P&C participation in the market has been waning, though not to the extent as that of banks. Therefore, the market for tax-exempt bonds is dominated by individual investors, either investing on their own or through their proxies, mutual and money market funds.

As of the third quarter of 1990, approximately $790 billion in tax-exempt securities were outstanding. Individuals held $531 billion, or 67 percent, P&Cs held $137 billion, or 17 percent, and banks held $123 billion, 16 percent. Individuals account for an even greater share of the new issue market. About 85 to 90 percent of all new tax-exempt securities issued are sold directly to individuals or to mutual or money market funds, which serve as conduits for individual investors.

There are two basic types of municipal securities, general obligation bonds and revenue bonds. General obligation bonds are secured by the general taxing power -- the full faith and credit -- of the issuing government. Revenue bonds are secured by a specific source of revenue, not by general taxing powers. The source of payment for revenue bonds nearly always involves user fees of some sort. The revenue source could be tolls collected on a bridge, tipping fees at a landfill, water and sewer charges, revenue from gate leases at an airport, or any other kind of revenue stream that does not depend on the general taxing power of the issuer. Of the approximately $127 billion in new long-term tax-exempt securities issued in 1990, approximately $41 billion, or 32 percent, were general obligation bonds and $86 billion, or 68 percent, were revenue bonds.

State and local issuance of tax-exempt bonds is regulated under the Internal Revenue Code. In general, most public projects can be financed with tax-exempt debt. For projects where there is an element of private participation, rules for issuing tax-exempt bonds are more strict. Under current law, if more than 10 percent of the proceeds of a bond issue are used by a private party and more than 10 percent of the debt service on a bond is secured by a private party, that bond is classified as a private-activity bond, and, in general, such a bond cannot be issued tax-exempt. However, some tax-exempt private-activity bonds are allowed. Issuance of private-activity bonds is regulated in two ways, by use and by volume.

First, private activity bonds can only be issued for one of several uses delineated in the Tax Code. Allowable uses for private activity bonds include, among others, airports, water and sewer systems, solid waste disposal facilities, hazardous waste facilities, mass transit systems, high-speed rail systems, low- and moderate-income multifamily housing projects, single-family mortgage revenue bonds and small-issue industrial development bonds. While there are no restrictions on tax-exempt financing for public-purpose infrastructure projects, some traditional infrastructure-related facilities, such as roads and bridges, if they contain an element of private involvement, are not eligible for private-activity bond financing on a tax-exempt basis. In addition to use restrictions, issuance of private-activity bonds is limited by annual state volume caps. All annual private-activity bond issuance in a state cannot exceed the greater of $50 *per capita* or $150 million. Certain uses of private-activity bonds, such as airports, are exempt from volume caps. Since they were instituted in 1982 and 1984 and significantly tightened in 1986, restrictions on private-activity bond financing have hurt the ability of states and localities to work in partnership with the private sector in devising innovative solutions to problems in financing infrastructure.

Even with restrictions on tax-exempt financing, states and localities are still able to use the municipal bond market effectively to finance public investment. State and local government issued $38.5 billion in long-term tax-exempt securities for new-capital financing of infrastructure-related projects in 1990, the most ever in a single year and a 27 percent increase over the $30.3 billion issued in 1989. An additional $12.1 billion was issued in 1990 for investment in schools.

Even with this level of state and local investment, however, there are projects that cannot be financed with tax-exempt bonds because they contain elements of private participation. Either the project being considered is not eligible at all for tax-exempt financing due to use restrictions, or the state in which the bonds would be issued has reached its private-activity bond limit under volume cap restrictions. For projects like these, some governments issue taxable bonds. However, the taxable municipal bond market is small and illiquid relative to the tax-exempt market. Only $3.5 billion in taxable municipal securities were issued in 1990, compared to approximately $127 billion in tax-exempt securities. The taxable municipal bond market has not proven to be an attractive financing alternative for most state and local governments.

I understand that the Subcommittee is considering legislation to establish a commission to study the feasibility of creating a financial security that would attract pension fund investment in America's infrastructure. I commend the Subcommittee's attention to issues surrounding infrastructure financing, and your consideration of alternative policy schemes. At the very least, a commission to study infrastructure financing alternatives would attract national attention to issues surrounding public investment. However, I would like to recommend that the scope of the commission not be limited simply to the creation of a new infrastructure security, but be expanded to include any number of policy alternatives related to infrastructure financing. Hopefully, the commission would be successful in setting forth innovative schemes for infrastructure investment that would include all levels of government as well as the private sector. I understand that the jurisdiction of this Subcommittee does not extend to provisions of the Tax Code that prevent state and local governments from using tax-exempt financing to the extent that they could. However, given the historical success of the tax-exempt bond market in financing our nation's infrastructure, I believe the commission, if established, would be remiss if the scope of its study did not include an examination of how state and local use of tax-exempt financing might be expanded to encourage even greater levels of public investment.

Given such a complete mandate, PSA would be grateful for the opportunity to offer its full support and participation in the work of the commission. The capital markets play a major role in financing infrastructure, and I am certain that PSA's membership would be able to make a significant contribution to the task of the commission.

Thank you, Mr. Chairman, for this opportunity to testify. I would be happy to address any questions you might have.

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Office of the President

March 20, 1991

The Honorable Quentin N. Burdick
Chairman
Environment and Public Works Committee
United States Senate
SD-458 Dirksen Office Building
Washington, DC 20510

Dear Chairman Burdick:

The National Industrial Transportation League, the nation's oldest and largest shippers' transportation trade association, takes this opportunity to request that its comments be made part of the record developed by your subcommittee's continuing series of hearings on reauthorization of the federal highway program.

The League is a voluntary association of shippers, receivers, and other purchasers of freight transportation services. It is the only national organization representing shippers of all sizes and commodities using all modes of transportation to move goods in intrastate, interstate, and international commerce. Its members, directly or indirectly, are responsible for the routing of about 80 percent of the nation's commercial freight.

Like you and Chairman Moynihan, the League supports a multi-year reauthorization plan which stresses the need for better coordination among the nation's transportation modes and recognizes the impact our highways have on competitiveness. Facilitating intermodalism is an important step in improving U.S. productivity and widening market opportunities for our goods both at home and in global commerce. Identifying and providing adequate funding for the major highways facilitating the flow of commerce is another important step in this process. The League also supports taking the Highway Trust Fund off budget to better ensure that these revenues are spent for their intended purpose.

There is one element the League respectfully requests be incorporated into any reauthorization plan approved by your subcommittee. This proposal would greatly enhance the efficiency of our nation's trucking industry, and make the U.S. highways a full partner in increasing U.S. productivity. It is supported by the Administration and certain members of your committee.

The League is asking that your highway reauthorization legislation include the provisions contained in sections 508 and 305 of S. 610, the Administration's highway reauthorization plan.

These provisions represent billions of dollars in increased productivity by eliminating duplicative paperwork requirements that have no clear safety or other public interest benefit. Their enactment would help the trucking industry better fulfill its potential in meeting the nation's intermodal needs by giving it additional flexibility in tailoring service packages better to meet its customers' needs.

These comments are meant to augment the comprehensive plan the League outlined last year. Attached for your information is a copy of the proposal, which makes the nation's highways a full partner in U.S. efforts to effectively compete in global commerce.

In short, this plan calls for:

A reorganization and restructuring of national transportation policies and procedures to develop an integrated approach to logistics and supply chain issues.

Prompt spending of all federal Highway Trust Fund revenues so that the nation's road system receives the critical care it needs to more effectively foster U.S. participation in domestic and international commerce.

A continued emphasis on safety as well as a new focus on technological and environmental considerations so that transportation contributes to achieving clean air and related goals.

Exploration of new financing sources after current federal balances are spent.

An end to intermodal conflicts which erode productivity and needlessly add to the cost of sourcing, marketing, and distributing U.S. goods.

Prompt implementation of productivity improvements that will end unnecessary government-imposed costs on the trucking industry and improve overall national productivity.

The League appreciates this opportunity to present the views of the shipper community. It looks forward to working with you and your staff on this important issue so that this country benefits from the safest and most efficient national highway system possible. If the League can be of any further assistance, please do not hesitate to contact me.

Sincerely,

James E. Bartley

James E. Bartley
President

Attachment

NITL POSITION PAPER: MEETING THE NATION'S COMMERCIAL HIGHWAY NEEDS

PREAMBLE

> Transportation is the foundation of our success in global markets, and today every market is global. In fact, we are at a time when markets mean more than just territory. In the face of this expanding international competition, we no longer can take transportation for granted. We need to maintain, expand, and make our transportation system more productive. We need better application of management and technology.
>
> -- U.S. Secretary of Transportation Samuel K. Skinner

This is a nation that is relearning what it means to be competitive, productive, and efficient. Nothing is more central to achieving those goals than our ability to move physical goods. Transportation and logistics generate 25 cents of each dollar of our Gross National Product, while transportation alone is responsible for 10 cents of our GNP dollar.

Because of the relatively long distances between domestic and worldwide markets, America's highways are becoming warehouses for products on the move. American companies, on average, are warehousing only about half the inventory of raw materials and finished goods than they had on hand only a few years ago. The rest is moving, because that is what it takes to be competitive today. Companies and suppliers of all sizes are depending on each other more heavily than ever before, and they are depending on our nation's highways to keep raw materials and finished products moving.

The need to develop integrated logistics arrangements in domestic and international commerce requires a reorganization and reordering of transportation policies and procedures. This evolution also requires an intermodal approach to these policies and procedures -- an approach that increasingly emphasizes the role that transportation and logistics play in determining the marketability of U.S. goods at home and throughout the world.

The transition to a paperless, high tech work environment will require more international cooperation, higher degrees of productivity, quicker response times, and greater emphasis on quality and customer service. The United States must play a leadership role in the requisite national and international forums shaping the present and future use of electronic data interchange and other high tech innovations to promote our commercial interests.

Infrastructure funding and maintenance has a critical impact on commerce. Serious efforts must begin promptly to provide the critical care that our national transportation system needs. Innovative solutions must be identified and developed to maximize existing resources and promote promising emerging technologies.

To this end, Congress should enact highway reauthorization legislation which recognizes and fosters a competitive and efficient national transportation system able to meet the challenges of a global marketplace. The National Industrial Transportation League believes that the following principles and recommendations equip the nation with an effective blueprint for achieving this goal.

A. HIGHWAY INFRASTRUCTURE

In 1982, under the leadership of former Secretary of Transportation Drew Lewis, the public and private sectors attempted to address the deteriorating condition of our nation's roads and bridges. Through a combination of tax increases and productivity offsets, an additional $5 billion a year was put in the Highway Trust Fund. However, these funds were not spent for their intended purpose. Instead, the HTF reserves were increased so that these unspent but dedicated monies now total between $11 billion and $17 billion.

The League believes that continued deterioration of our national highway and bridge systems requires the spending of all of the Highway Trust Fund's uncommitted balances. The trust fund's revenues were collected for capital improvements that are desperately needed if the U.S. is to remain and improve its competitive position in the international marketplace. They were never intended to finance DOT operations or federal safety enforcement programs. DOT and related safety operations should be financed from general revenues since they clearly benefit the public at large, and not merely the users of the nation's freight transportation system.

The League believes that the upcoming reauthorization proposal should give serious consideration to imposing spending deadlines so that collected monies are used for their intended purposes. In addition, special attention should be given to identifying, upgrading, and maintaining a priority system of commercially vital roads and bridges, as well as to assuring that rehabilitation work includes upgrading of road design to improve public safety and to better accommodate the nation's commercial needs.

This system should include the roads which carry the bulk of the nation's commerce. Special priority should be paid to efforts eliminating urban congestion and facilitating the use of more productive truck equipment. In cases involving overweight or oversize shipments, a uniform permit system should be developed so that these specialized transportation needs can be met in a safe and efficient manner.

In addition, the reauthorization proposal should encourage the development of transportation alternatives such as mass transit, magnetic levitation systems, "smart car" and "smart road" technology, and other appropriate innovations which will help the nation to maximize efficient use of the existing highway system. To the extent that new capacity needs are identified, mechanisms should be put in place to facilitate efforts aimed at meeting these needs, and should allow proponents to come from the federal, state, local, or private sector.

B. SAFETY

Assuring safety on the nation's highway system should continue as a top national priority. Safety not only saves lives and prevents injuries and accidents, it also improves productivity. This, in turn, enhances the marketability of U.S. goods in domestic and international commerce. Today's emphasis on quality requires increased attention to and promotion of highway, vehicle, and driver safety efforts.

The safety legislation of the 1980s has been and continues to be a success. The Motor Carrier Safety Assistance Program, the commercial driver license, the expansion of the federal safety requirements to the commercial zones, and the drug and alcohol testing requirements for certain transportation professionals have significantly lessened the number of citizens injured or killed on the nation's roads.

As the most recent statistics from the Department of Transportation's National Highway Transportation Safety Administration demonstrate, highway deaths have declined from the 1980 level of 3.3 per 100 million miles traveled to 2.2 per 100 million miles traveled in 1989. In announcing its 1989 data, NHTSA noted that had the 1980 accident rate remained unchanged for the remainder of the decade, roughly 70,000 Americans would have died in 1989, rather than the actual count of 45,500 -- a decrease of almost 50 percent.

The League firmly believes that the reauthorization legislation must continue this commitment to safety by providing the necessary general revenue funds to continue and expand MCSAP inspections, to assure effective stewardship of the commercial driver's license program, to assure adequate alcohol and drug testing of transportation personnel holding jobs with critical safety impacts, and to continue and expand the safety audit and inspection programs for commercial freight operations.

Whether through this effort or in other legislation, there is another important safety aspect which needs to be addressed -- assuring that truck routing decisions and related decisions are made on the basis of sound safety and engineering standards, rather than local political concerns.

Whether the issue is hazardous materials transportation or the use of more productive truck equipment, there has been an increasing tendency by states and their political subdivisions to attempt to export the perceived risk to other jurisdictions. The resulting barriers have impaired safe transportation. In many cases, they increased the likelihood of accident and injury by requiring the use of less safe roads or more circuitous routes that extend the public's exposure to these commodities.

The League believes that the solution to this problem lies in strong federal leadership and the creation of uniform guidelines for routing and other operating practices. These guidelines should recognize that unique local circumstances may require restrictions to assure public safety. In addition, they should require that any resulting local limits are justified by sound safety and engineering principles.

C. ENVIRONMENT, CONGESTION, AND CLEAN AIR

Two factors determine how the trucking industry impacts on the environment and the nation's air quality. The first is the amount of fossil fuel a truck consumes; the second is the emissions resulting from the consumption of this fuel. While improved Clean Air Act standards will help to mitigate the second problem, the reauthorization legislation needs to foster bold new approaches to the first.

The League believes that there should be funding of research and development projects, which build on past efforts, to identify more efficient and cleaner fuels, and assess the feasibility of adapting them for mass production. The fewer gallons of fuel consumed over a given distance translates into a reduction in negative environmental impact.

The League also believes that there should be funding to study emerging technological innovations and how they could be adapted to improve the productivity of our national transportation system and the commercial equipment which operates over it.

Another important environmental consideration is packaging. There is a clear need to develop packaging which places less strain on our nation's land fills and on the environment. Transportation has a contribution to make through improved packaging standards, such as RSPA Docket HM-181, and through development of new packaging technology which better contains the substances they hold.

As for congestion, special attention should be paid to proposals which would create restricted hours of operations for commercial vehicles or would impose other restrictions. Although the topic of much discussion, there has been no serious study of the effects of such a plan. There are no reliable projections about how such a plan would affect work hours, basic services, mass transit needs, and the whole host of related business functions that would be affected if pickup and deliveries had to occur beyond normal business hours.

While such proposals may appear to offer a solution to congestion problems, there would be disruptions, perhaps serious disruptions, in the normal business flow to which we have geared society. The League believes that these costs should be identified and estimated so that informed decisions can be made about the value of this approach to solving the congestion problem.

Effective land use planning is another important element in helping to resolve current congestion problems. The gentrification of urban areas and the rapid development of independent suburban centers have created a demand for land that outstrips available space. This trend creates an increasing premium on land and its supporting infrastructure. It also requires that effective transportation planning expand the scope of issues traditionally considered in making these determinations.

Future transportation planning efforts need to better incorporate into their projections, and better coordinate with, land use needs and projections. In addition, these efforts must have an intermodal perspective. All transportation needs and options should be considered so that the most efficient and cost effective can be chosen. Research and development funding should be directed in this area.

D. UNIFORMITY

If improving the ability of the U.S. to compete in domestic and global commerce is to become a national goal, then a new emphasis is needed on streamlining and standardizing government-imposed rules and regulations that needlessly add to the cost of doing business. Transportation, especially highway transportation, is a prime example of how the U.S. is maintaining internal trade barriers that make no contribution to the public good. A study conducted at the University of Pennsylvania's Wharton School of Business estimates that unnecessary state regulation of trucking matters costs business and industry between $6 billion and $12 billion annually in lost productivity.

There is a clear and present need for state governments and their political subdivisions to more closely conform to federal standards when regulating the trucking industry. Given the transportation reforms occuring within the European Community, it will soon be easier to move goods from the United Kingdom to Germany than it will be to move goods from New York to California or from Houston to Dallas.

One of the important first steps in dismantling these trade barriers is to standardize certain highway related practices and procedures so that there is a unified, and to the greatest extent possible uniform, operating system.

First and foremost, there should be reasonable, uniform requirements governing access for more productive truck equipment. The DOT rulemaking on this topic has been under review for far too long. Every effort should be made to ensure that the final rules are implemented promptly so that this equipment can be used wherever sound safety and engineering principles allow.

Secondly, equipment size and weight limitations should be uniform throughout the federal highway system. The federal road system was created to promote the common good by better meeting commercial and defense needs. When goods are transported over roads created or maintained with federal funds, efforts should be made to assure that these roads promote commerce by making them subject to the requirements of the federal system, rather than the often conflicting patchwork of state and local rules and regulations. If unique local conditions exist, they should be addressed, as noted earlier, based on sound safety and engineering principles.

In addition, there is a need for federal leadership in helping to promote the acceptance of state accords which promote uniformity in the taxation and registration of trucks and the fuel they consume. The states have negotiated these accords -- the International Registration Plan and the International Fuel Tax Agreement. However, for a variety of reasons, not all the states have adopted them. These accords have no impact on how much a state taxes or charges. They merely standardize the procedures so that shippers and carriers no longer have to spend billions of dollars annually to comply with the current, and often byzantine, system of taxation and registration.

A similar plan should be undertaken with respect to the licenses and permits imposed on hazardous materials and on oversize and overweight shipments. The current license and permit systems governing these commodities are seriously flawed, and frequently appear to focus on generating revenues, rather than promoting the safe and efficient movement of these commodities. The reauthorization legislation should undertake efforts that will promote state uniformity and cooperation in this area.

In addition to identifying and eliminating government-imposed internal trade barriers, the reauthorization also should recognize the increasing role international standard setting forums are playing in determining how America moves her commerce. The Department of Transportation should be designated as the lead federal agency to address these transportation concerns and should be supplied adequate funds and personnel so that U.S. interests can be promoted properly.

E. PRODUCTIVITY

Uniformity yields improved productivity. As a result, the savings generated by uniformity become the productivity gains by which American business and industry improve the marketability of their goods in domestic and global commerce.

As noted by the Wharton study, making certain basic reforms in the economic regulation of the trucking industry will generate between $6 billion and $12 billion productivity savings in the the national economy. Thus, a critical component in improving U.S. competitiveness is assuring that motor carriers are free from state restrictions which do not enhance the safety of their operations. To the extent a carrier is licensed by the federal government, there should be no duplicative requirement by the state that the carrier also obtain state operating authority.

State regulation of the trucking industry should be limited to those carriers whose operations affect only intrastate commerce. In addition, states should be encouraged to adopt entry and rate requirements which follow federal standards so that regulation is limited to the minimum consistent with the public interest. In addition, entry, rate, and related operating regulations should be reviewed regularly to assure that they continue to serve the public interest.

In addressing the issue of federal standards, special mention should be made about the effectiveness of the current liability requirements for cargo insurance and loss and damage. This federal system governs common carrier liability, and provides the necessary uniformity to assure standardized treatment of, and effective redress for, all parties. It should be retained.

Given the growing impact that electronic data interchange is having on the transportation industry, any regulatory review efforts should include identification of those functions which could be handled in an EDI format. The savings generated by EDI are impressive. For example, the cost for creating a paper copy bill of lading is about $25, while it costs a $1.25 to prepare the same information electronically.

The increasing pace of change requires that the exchange of information between the federal government and the private sector be improved. A similar improvement also is needed in the communications between and among federal and state governments. Coordinated planning and information flow are the keys to assuring that public policy and private initiative are working together to improve the marketability of U.S. products and the availability of U.S. jobs and tax base.

Federal assistance also would be useful in stimulating the training of commercial drivers. Such training can be expected to improve highway safety as well as improve the supply of these individuals. An adequate supply of properly trained drivers should guarantee that the trucking industry will continue to be able to meet commercial and defense needs.

Because of the need to control costs so tightly, U.S. business and industry has reorganized how raw materials are sourced, products are manufactured, and finished goods are delivered to the consumer. Known as integrated or supply chain logistics, this approach is yielding impressive productivity gains that are being used to expand market share and to enter new markets. Transportation is one of the most critical elements in this system, since it often determines whether and to what degree a company can participate in any given market. In essence, business has relearned an old maxim: Goods moving in a localized area is trade. Goods moving between localized areas is commerce.

The League believes that the government also needs to adopt this approach toward transportation. Transportation is not an isolated element of public policy. It is an integral part of efforts to expand U.S. world trade, improve U.S. economic growth, and better serve the public interest. The reauthorization legislation offers an excellent opportunity to use these opportunities to promote uniformity and its resulting productivity gains. These reforms will have broad based benefits that ultimately will foster our nation's overall economic objectives.

F. ENFORCEMENT

Enforcement is the key to improving highway safety, preventing accidents, and saving lives. A 1988 study by the California Highway Patrol and the California Public Utilities Commission clearly demonstrates that when there is a high level of enforcement actions, there is a low level of accidents. Conversely, where there is a low level of enforcement actions, there is a high level of accidents.

The League firmly believes that safety enforcement should be a major portion of the reauthorization legislation. In particular, the funding for the Motor Carrier Safety Assistance Program should be continued and expanded. In addition, similar efforts should be undertaken with respect to the laws and regulations governing the transportation of hazardous materials.

When enforcement is increased, efforts should be made to standardize fines and penalties and to dedicate those funds for safety purposes. The Department of Transportation should be directed to establish guidelines for the imposition of these fees, and the resulting revenues should be dedicated to enforcement and/or other highway safety related endeavors.

In addition to promoting uniformity in fees and penalties, there needs to be improved communication between federal and state safety enforcement personnel. Specifically, there should be greater coordination about enforcement efforts and greater sharing of pertinent information. Pilot programs aimed at achieving these goals should be encouraged, perhaps with seed money funding.

G. FUNDING AND TAXATION

Because all of the monies raised by the Surface Transportation Assistance Act of 1982 were not spent for the intended capital improvements, the nation again must find ways to generate increased funding for the nation's roads and bridges.

In identifying this funding, the League believes that certain criteria should be used. First, user fees need to be broad based, fair, and equitable.

Second, the integrity of the Highway Trust Fund needs to be better protected. The most effective protection which can be offered would be to remove it from the unified budget. This is a dedicated fund which only can be used for highway purposes. Using its reserves as a means of masking the federal deficit is not sound public policy. Sequestration of these funds by Congress serves only to further increase the price we ultimately will have to pay to repair, restore, and rebuild these integral parts of our national infrastructure.

Third, if HTF taxes are to be increased, there needs to be productivity offsets so that the marketability of U.S. goods and products is not unduly prejudiced either within the U.S. or in global markets. The items identified in the uniformity and productivity sections of this paper could form the framework for discussing how these offsets should be structured.

Finally, alternative means of funding these improvements should be explored and evaluated. Among the options which should be reviewed is dedicated toll financing. Whether a federal, state, or private initiative, the minimum restrictions on this sort of endeavor should be that the tolls be designed to cover the reasonable costs of the project, and that they be dedicated to highway construction, maintenance, and repair. In addition to toll financing, other funding alternatives should be explored. They should be subject to the minimum restrictions for toll financing. In addition, they should be fair, equitable, and easy to administer.

H. MULTIMODAL IMPLEMENTATION

The increasing importance of integrated logistics to the national effort to improve U.S. competitiveness requires an intermodal approach to transportation issues. This intermodal perspective recognizes that the allocation of modal resources needs to be highly coordinated if we are to meet the nation's transportation needs in the most efficient and cost effective manner possible. Research and development efforts increasingly should be geared to foster this overall goal.

Government policy needs to be revamped so that there is increased cooperation among the federal departments, administrations, and agencies responsible for transportation activities as well as with their state and local counterparts. In addition, there is a clear need for federal and state governments to improve communications with the private sector so that public initiatives more efficiently meet private needs.

The current federal subsidy systems also are in need of reform. As presently structured, they foster infighting among the modes. Steps need to be taken so that there no longer is an environment which sets one mode against the other in an attempt to undercut efficiency and productivity. This situation benefits no one, least of all business and industry, who ultimately must absorb the unnecessary costs generated by this conflict.

CONCLUSION

Transportation and the infrastructure over which it operates should be viewed as a natural resource. Like the environment, it needs continuing care, maintenance, and protection to function properly. Roads and bridges are not permanent, one-time investments. Rather, they are on-going investments in need of regular repair and rehabilitation. The failure to make these regular investments results in a deteriorating infrastructure less and less able to meet the nation's commercial and defense needs.

Finally, there is a clear and present need for the reauthorization legislation and all related transportation proposals to become more market oriented and international in their outlook. U.S. goods compete with those made in foreign countries and they do so both inside America as well as in global markets.

Planning, investment, and overall policy need to assure that U.S. transportation promotes the marketability of our national goods whether they are sold domestically or throughout the world. The failure to do so will result in policies which further erode the nation's industrial and manufacturing base as well as export jobs and deplete the tax base. By the same token, if this type of policy is implemented, the nation will be in a position to meet successfully the challenges posed by the Pacific Rim, Europe 1992, and a revitalized eastern Europe. This will help to preserve and enhance the domestic job pool and augment the national tax base.

The challenge of the upcoming reauthorization bill is to create a national highway system which enhances commerce and the general well being. The League offers this paper to provide a blueprint for a successful transition into the 21st century.

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